8. STATEMENT OF SIGNIFICANCE

Certifying official has considered the significance of this property in relation to other properties:
Nationally: X Statewide: __ Locally: __.

Applicable National Register Criteria:	A_X_ B__ C_X_ D__.
Criteria Considerations (Exceptions):	A__ B__ C__ D__ E__ F__ G
NHL Criteria:	1 and 4
NHL Theme(s):	II: 4 Creating Social Institutions and Movements: recreational activities III: 5 Expressing Cultural Values: architecture, landscape architecture, and urban design V: 3 Developing the American Economy: transportation and communication
Areas of Significance:	Engineering Landscape Architecture Transportation Politics/Government Outdoor Recreation
Period(s) of Significance:	1913-37
Significant Dates:	1913, 1916, 1918, 1922, 1936, 1937
Significant Person(s):	N/A
Cultural Affiliation:	N/A
Architect/Builder:	Lancaster, Samuel C.; Hill, Samuel; Elliott, John Arthur; Purcell, Charles H.; Billner, Karl P.; Metzger, Lewis W.; McCullough, Conde B.; Oregon State Highway Department
NHL Comparative Categories:	XVII. Landscape Architecture XVIII: B Technology (Engineering and Invention): transportation XXXII: C Conservation of Natural Resources: the conservation movement matures, 1908-1941 XXXIV. Recreation

State Significance of Property, and Justify Criteria, Criteria Considerations, and Areas and Periods of Significance Noted Above.

Summary

The Columbia River Highway (CRH) National Historic Landmark District meets NHL Criterion 1 as an outstanding example of modern highway development in 20th-century America for its pioneering advances in road design. These include the adherence to grade and curve standards, and the use of comprehensive drainage systems, dry and mortared masonry walls, reinforced-concrete bridges, and asphaltic concrete pavement on a rural, mountain road during the formative years of modern highway building in the United States. The district meets NHL Criterion 4 as the single most important contribution to the fields of civil engineering and landscape architecture by Samuel C. Lancaster and as an exemplar example of American landscape architecture, specifically as the first scenic highway in the United States. The CRH's aesthetic and engineering achievements greatly influenced the design and construction of other scenic highways, including national park roads, in the 1920s and 1930s. A combination of advanced engineering with landscape architectural elements as embodied in the CRH put in practice the concept of "landscape engineering" in modern highway design a decade before it was employed by the National Park Service on the Going-to-the-Sun Road and throughout the national park system.

Nearly forty extant roads constructed in the United States during the first decades of the 20th century possess state or national significance. These range from the Bronx River Parkway, to the Generals Highway, to the Pennsylvania Turnpike. Often, the terms "scenic highways" and "parkways" are used synonymously. Scenic highways are best described as those roads constructed to provide motorists with the opportunity to see up-close the landscape's natural beauty. Parkways, though, are roads or streets often associated with city beautiful campaigns, many of which swept the United States in the late 19th and early 20th centuries.

Many scenic highways, and those parkways that are more accurately described as scenic highways, are associated with the country's national park system and were constructed in the years following the First World War. True parkways were often part of a movement to create park-like settings out of wastelands. Other roads such as the Lincoln Highway, the Dixie Highway, and Route 66 are not considered scenic highways or parkways. They possess their significance largely for pioneering the nation's modern, transcontinental highway system.

Constructed from 1913 to 1922, the CRH predates all other scenic highways in the United States, including the Storm King Highway, the Wawona Road, and Skyline Drive. The CRH is contemporary with the Bronx River Parkway. It predates, however, the Merritt Parkway, the Rock Creek and Potomac Parkway, and the Arroyo Seco Parkway.

A story of modern highway construction in the Pacific Northwest and the United States cannot be told without discussing the contributions of Samuel C. Lancaster, engineer and landscape architect; and Samuel Hill, entrepreneur and good roads proponent. The two men converged on Washington and Oregon in the first two decades of the 20th century and became strong forces in improving the region's road system. The high point of their work was Oregon's Columbia River Highway, more recently known as the Historic Columbia River Highway (HCRH). It was

constructed between 1913 and 1922, and spanned 74 miles from Troutdale (15 miles east of Portland) to The Dalles (88 miles east of Portland).

The CRH, and its associated designed landscape, was a technical and civic achievement of its time, successfully mixing sensitivity to the magnificent landscape with ambitious engineering. In the CRH, Lancaster emulated the European style carriage roads in the Columbia River Gorge, while also designing and constructing a highway to advanced engineering standards. Throughout the route, Lancaster and subsequent locating engineers held fast to a design protocol that he developed after years of practical engineering experience and experimentation. It included accepting no grade greater than 5 percent, nor laying out a curve with less than a 200-foot turning radius. The use of reinforced-concrete bridges, combined with masonry guard walls and retaining walls, both on the road and on associated pedestrian trails, brought together the new with the old—the most advanced highway structures with the tried and tested, and all made by hand.[1]

In setting design standards for the CRH, Lancaster wore the hats of engineer and landscape architect. He artfully created an engineering achievement sympathetic to the natural landscape and in doing so made the Columbia River Gorge's idyllic natural setting accessible to tourists without unduly marring its beauty. Lancaster's CRH truly embodied the National Park Service's "Lying Lightly on the Land" philosophy, but a full decade before the concept was adopted for NPS roads and trails.

Historic Context

Introduction

Sunset Magazine's Howard O. Rogers wrote that he had seen Niagara Falls, the Grand Canyon, Pike's Peak, and Yellowstone Park, which he marveled at and became awestruck, but after driving the CRH through the Columbia River Gorge, in 1917, he believed that the highway was "a grand achievement in the science of modern road-building—nothing short of a national asset." In 1920, the periodical *Excavating Engineer*, believed that the CRH "stands today as undoubtedly the greatest monument to the road building industry in the West." "That most modern of roads," was Walter Winston Crosby's estimation of the CRH in his 1928 textbook entitled *Highway Location and Surveying*." Harriet Salt stated in her 1937 volume entitled *Mighty Engineering Feats: Clear and Concise Descriptions of Ten of the Greatest American Engineering Feats* that the CRH was "one of the world's greatest examples of highway engineering."[2]

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[1]Lancaster's design protocol included the exception that he would include curve radii of 100 feet in roadway designs. For each 50-foot reduction in curve radii, however, he dropped the grade by 1 percent. See Henry L. Bowlby, "The Columbia Highway in Oregon," special edition of *Contracting*, entitled "Columbia River Highway," 1. Dwight A. Smith, "Columbia River Highway Historic District: Nomination of the Old Columbia River Highway in the Columbia Gorge to the National Register of Historic Places, Multnomah, Hood River, and Wasco Counties, Oregon" (Salem, OR: Oregon Department of Transportation, Highway Division, Technical Services Branch, Environmental Section, 1984), 3; Henry L. Bowlby, "The Columbia Highway in Oregon," *Engineering News* 73, no. 2 (14 January 1915): 62. See also, Rufus Holman's quote in, "Highway Up Gorge Sam Hill's Dream," *Portland Oregonian*, 24 April 1932, s. 1, p. 16.

[2]Howard O. Rogers, "A Day on the Columbia Highway," *Sunset, the Pacific Monthly* 38 (May 1917): 80; "The Columbia River Highway," *Excavating Engineer* 14, no. 7 (September 1920): 222; W. W. Crosby and George

The CRH, however, is significant for more than engineering. John Yeon, a successful lumberman and later "Roadmaster" of its construction, simply saw this highway as "the greatest single asset not only in Oregon, but in the West." Phil Townsend Hanna, editor of the Los Angeles-based *Western Highways Builder,* wrote that "The hardy and honest people of Oregon have built the greatest highway in the world . . . no matter from what angle you consider it, as a transportation artery, as a scenic boulevard, or as an engineering feat." United States President Theodore Roosevelt believed that in the CRH, Oregon "had the most remarkable road engineering in the United States, which for scenic grandeur is not equaled anywhere." During a drive over the CRH in 1915, Major General George Washington Goethals, builder of the Panama Canal, said that the highway "is splendid engineering, and absolutely without equal in America for scenic interest." John Arthur Elliott, a locating engineer on the CRH, eloquently summed up the entire rationale for the route's alignment and construction. He wrote,

> The ideals sought [for the Columbia River Highway] were not the usual economic features and considerations given the location of a trunk highway. Grades, curvature, distance and even expense were sacrificed to reach some scenic vista or to develop a particularly interesting point. All the natural beauty spots were fixed as control points and the location adjusted to include them. Although the highway would have a commercial value in connecting the Coast country with the eastern areas, no consideration was given the commercial over scenic requirements. The one prevailing idea in the location and construction was to make this highway a great scenic boulevard surpassing all other highways of the world.[3]

"There is but one Columbia River Gorge [that] God put into this comparatively short space," Samuel C. Lancaster wrote, "[with] so many beautiful waterfalls, canyons, cliffs and mountain domes." "Men from all climes," he believed "will wonder at its wild grandure [*sic*] when once it is made accessable [*sic*] by this great highway." But, in addition, Lancaster, Hill, and several local promoters sought to create a route that employed the most advanced techniques available for road construction. In reflecting on the work's progress, Lancaster acknowledged that because of the country's rugged nature, with its wind and rain and winter weather, construction had been "slow and tedious and somewhat more expensive than ordinary work." But he saw it as

E. Goodwin, *Highway Location and Surveying* (Chicago: Gillette Publishing Co., 1928), 115; "The Columbia River Highway in Oregon, *Good Roads*, 1 January 1916, 3; Harriet Salt, *Mighty Engineering Feats: Clear and Concise Descriptions of Ten of the Greatest American Engineering Feats* (Philadelphia: The Penn Publishing Co., 1937), 198, see also 181-201.

[3]Yeon also considered Hanna's comments as very significant because "the people of California are loth to concede superiority in road matters to any place." Hanna is quoted in J. B. Yeon to Honorable Board of County Commissioners, Multnomah County, 27 April 1921, in folder 01/002—"Columbia River Highway—J. B. Yeon's Resignation . . . ," Clerk of the Board Road Files, Multnomah County Archives, Portland, Oregon; M. C. George, *The Columbia Highway through the Gorge of the Cascades from Portland to the Dalles* (Portland: James, Kerns and Abbott Co. [1923]), 6; Goethals is quoted both in M. C. George and in Lancaster, *The Columbia: America's Great Highway through the Cascade Mountains to the Sea*, 2d. ed. (Portland, 1916), 134; John Arthur Elliott, "The Location and Construction of the Mitchell Point Section of the Columbia River Highway, Oregon" (C.E. thesis, University of Washington, 1929), 2-3; Linda Flint McClelland believed that the CRH established the state of the art for building scenic roads in mountainous areas. See her volume, *Presenting Nature: The Historic Landscape Design of the National Park Service, 1916 to 1942* (Washington, DC: Government Printing Office, 1993), 103.

an extremely worthwhile task, "for if the road is completed according to plans, it will rival if not surpass anything to be found in the civilized world." It will be the "King of Roads."[4]

In a more practical light, many observers saw the CRH as a lifeline connecting Portland with the many commercial and agricultural areas along the Columbia River. Some even envisioned it as one of the spokes of similarly constructed routes radiating out towards central Washington and the Inland Empire of eastern Washington and northern Idaho, and meeting routes leading to other parts of the region and the nation.

The CRH gained national and international attention through its appearance in professional periodicals such as *Engineering News, Contracting, Engineering and Contracting, Good Roads*, and *Public Roads*. It also received widespread coverage in more popular writing, such as *Sunset the Pacific Monthly*, and *Scientific American*. Those in academia in the years immediately after the First World War offered the CRH in their highway engineering textbooks as a new standard in modern road building.[5]

Samuel C. Lancaster

Even though many see Samuel C. Lancaster as the preeminent player in early twentieth-century road building in the Pacific Northwest because of his work on the CRH, his role in the region began several years earlier in Washington State. Late in the first decade of the twentieth century, the Seattle Park Department employed him as a consulting engineer, where he helped design and oversee construction of a system of parks and boulevards outlined by the well-known landscape architect, John C. Olmsted. These contributions to Seattle's coming of age were part of the city's preparations for the Alaska-Yukon-Pacific Exposition of 1909, which also included an extensive regrading of Seattle's hilly business district. The city's civic leaders were determined to beautify Seattle for the event, which was a self-promotion vehicle to celebrate its phenomenal recent growth and bright future. A look at Lancaster's role in Pacific Northwest road building needs to begin, though, with an understanding of his formative years—when illness opened up opportunities for him to hone his skills as a young and energetic civil engineer.[6]

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[4]Samuel C. Lancaster to Amos S. Benson, 7 February 1914, folder "Multnomah County, 1914," box 4, RG 76A-90, Oregon State Archives, Salem; Samuel Christopher Lancaster, *Romance of the Gateway through the Cascade Range* (Portland: J. K. Gill Company [1929]), 23.

[5]See Bowlby, "The Columbia Highway in Oregon," *Engineering News* 73, no. 2 (14 January 1915): 62-64; K. P. Billner, "Some Bridges on the Columbia Highway," *Engineering News* 72, no. 24 (10 December 1914): 1145-49; "The Multnomah County Mountain Boulevard," *Contracting* August 1916, reprint, 9-10; Henry L. Bowlby, "The Columbia Highway," *Good Roads* 11, n.s., no. 10 (4 March 1916): 124-27; F. J. Brady, "The Columbia River Highway in Oregon," *Good Roads*, 6 October 1920, 168-71; A. A. Rosenthal, "Structural Features of a Great Scenic Highway," *Contracting*, June 1916, reprint, 5-8; George C. Warren, "The Columbia River Highway," *Contracting*, May 1916, 1-4ff; K. P. Billner, "Design Features of the Various Types of Reinforced Concrete Bridges Along the Columbia River Highway in Oregon," *Engineering and Contracting* 43, no. 6 (10 February 1915): 121-23; [Conde B. McCullough] "Two Interesting Concrete Bridges in Oregon," *Engineering and Contracting*, 26 October 1921, 389-91; "The Columbia River Highway in Oregon," *Good Roads*, 1 January 1916, 3-8; "Substantial and Attractive Guard Rail on Oregon Road," *Public Roads*, March 1920, 9-10; Joe D. Thomson, "The Columbia River Road," *Sunset, the Pacific Monthly*, 29 (December 1912): 693-98; C. E. Fisher, "Interest in Westerner; A National Road Builder" *Sunset, the Pacific Monthly*, 31 (September 1913): 542-44; "A Beautiful Link in Our Highway System," *Scientific American* 114, no. 25 (17 June 1916): 1. For textbooks, see, for instance, Crosby and Goodwin, *Highway Location and Surveying*.

[6]Ronald J. Fahl, "S. C. Lancaster and the Columbia River Highway: Engineer as Conservationist," *Oregon Historical Quarterly* 74, no. 2 (June 1973): 105. Forward-thinking promoters conceived of the Alaska-Yukon-

Lancaster grew up in the South. Born in 1864 in Magnolia, Mississippi. His family moved to Jackson, Tennessee, in the 1870s with hopes for economic prosperity. There, Samuel studied engineering at Union University, a Southern Baptist-sponsored school, but in 1881 his father died. This change of circumstances cut short Samuel's formal education. Like so many engineering students and aspiring young engineers in the late nineteenth century, Lancaster hired on with the Illinois Central Railroad as a construction engineer. He soon moved on to the Gulf, Colorado and the Santa Fe Railroad, but a life-threatening case of typhoid fever and polio, in 1886, ended his brief engineering career with the railroads.[7]

Lancaster recovered and in 1889 he found employment back home with the city of Jackson, Tennessee, as its engineer. A year earlier, Jackson residents, living in a city rich with muddy streets toured other cities free of charge on the Illinois Central's lines to view improved road and sewer systems. The railroad encouraged Jackson and other cities along its lines to modernize because it saw economic growth for itself if these communities showed prosperity. Jackson's citizens brought back with them a strong conviction that their city should carry out its own civic improvements. Lancaster installed sewer, water and light systems, paved streets, and constructed parks. But by far, Lancaster's most ambitious undertaking was designing and building a half-million-dollar model system of hard-surfaced roads in and around Jackson, for surrounding Madison County in 1903.[8]

The federal government's Office of Public Road Inquiries and Secretary of Agriculture James Wilson noted Lancaster's successes. Wilson soon appointed him a consulting engineer with the Office and sent him on a nationwide tour to preach the "Gospel of Good Roads." But it took the combination of Lancaster's know-how and entrepreneur Samuel Hill's vision to make a lasting impression on Pacific Northwest road building. Lancaster first encountered Samuel Hill in 1906 at a Washington State Good Roads Association (WSGRA) meeting in Yakima, where members discussed the effect of the 1905 act that created the Washington State Highway Commission and raised the annual levy for highways.[9]

Samuel Hill and the Pacific Northwest

Samuel Hill was a wealthy Northern Pacific Railroad attorney, financier, and son-in-law of Great Northern Railway president James J. Hill. Samuel Hill was born in North Carolina in 1857 to a physician and his wife who possessed strong Unionist convictions during the outbreak of the Civil War. They fled the South for Minneapolis, Minnesota, where Hill's father soon died. Young Samuel worked at meager jobs before earning a bachelor's degree from Harvard in 1879.

Pacific Exposition as the heart of a program to help Seattle compete with Portland, its rival port city in the Pacific Northwest. Portland had, a few years earlier, inaugurated similar "city-beautiful" projects in anticipation of its highly successful Lewis and Clark Exposition of 1905. See George A. Frykman, "The Alaska-Yukon-Pacific Exposition, 1909," *Pacific Northwest Quarterly* 53 (July 1962): 89-99; see also Dorothy O. Johansen, *Empire of the Columbia: A History of the Pacific Northwest*, 2d ed. (New York, 1967), 405-21.

[7]Fahl, 104.

[8]One citizen exclaimed that the roads in Madison County, Tennessee, were in such deteriorated condition that two strong mules were required to draw a wagon with two milk cans and "all day was consumed in going a few miles." Samuel C. Lancaster, "Practical Road Building in Madison County, Tennessee," *Yearbook of the United States Department of Agriculture, 1904* (Washington, DC: Government Printing Office, 1905), 323-26, 330-33.

[9]The Bureau of Public Roads succeeded the Office of Public Roads Inquiries. The Federal Highway Administration succeeded the Bureau of Public Roads. See Fahl, note #9, for details on the Office of Public Road Inquiries; see also John E. Tuhy, *Sam Hill, The Prince of Castle Nowhere* (Portland: Timber Press, 1983), 132-33.

Hill soon studied law and sold real estate in Minneapolis. His success in business and law drew the attention of James J. Hill, who hired him as a member of the Great Northern's legal staff. Samuel Hill married James Hill's daughter, Mary.[10]

Samuel Hill took on additional responsibilities in James J. Hill's industrial empire. In 1895, James J. Hill named Samuel Hill president of the Seattle Gas and Electric Company. Samuel Hill brought with him to the state of Washington his entrepreneurial skill and a strong personal interest in good roads. By 1899 he helped found the WSGRA and by 1904 he had become well known in good roads' circles, even testifying before Congress on the subject.[11]

At the 1906 WSGRA convention in Yakima, Samuel Hill and Lancaster had struck up a close, lifelong friendship—the key to it was their mutual passion for good roads. Shortly, Hill convinced Secretary Wilson to loan Lancaster for six months to lobby in Washington for increased state aid for road construction during the 1907 state legislative session. Six months, though, was not long enough to convince lawmakers to make a stronger commitment to good roads.[12]

Meanwhile, Hill convinced Seattle Park Department commissioner Reginald H. Thomson to hire Lancaster to oversee the design and construction of a $7 million park and boulevard system concept outlined by John C. Olmsted in 1903 as part of Seattle's preparation for the Alaska-Yukon-Pacific Exposition of 1909. The plan added fifty-miles of boulevards ringing the city and 2,000 acres to Seattle's already large park system.[13]

Lancaster and the board gave priority to Lake Washington's western shore, immediately east of Seattle's downtown business district. There, Lancaster created a thirty-foot macadam roadway of easy grades and gentle curves, with a concrete sidewalk paralleling it near the water's edge. A row of shade trees was planted along a parking strip to tie in the parkway with the naturally wooded slopes. Where needed, Lancaster designed ornamental concrete bridges and culverts to span the many creeks that emptied into Lake Washington. In sum, he had taken the practical experience he had gained just a few years earlier in Tennessee and applied it where it also required a strong awareness of aesthetic considerations and sensitivity to the natural surroundings' creative beauty.[14]

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[10]R. B. Bermann, "Hill Tried Many Careers and Succeeded In Them All," *Seattle Post-Intelligencer*, 27 February 1931, typewritten copy held by Washington State Library, Olympia.

[11]James L. Hockenhull, "Oh, Say Can You See: The Columbia River Scenic Highway," *Automobile Quarterly* 32, no. 1 (Fall 1993): 91-92; Tuhy, *Sam Hill, The Prince of Castle Nowhere*, 132-33.

[12]*First Annual Report of the [Washington State] Highway Commission* (Olympia, WA, 1906); Tuhy, *Sam Hill, The Prince of Castle Nowhere*, 132; John Kevin Rindell, "From Ruts to Roads: The Politics of Highway Development in Washington State, 1899-1917" (M.A. thesis, Washington State University, 1987): 27-30; Tuhy, *Sam Hill, The Prince of Castle Nowhere,* 133.

[13]Thomson was a good friend of Hill's and also a fellow WSGRA charter member. See Tuhy, *Sam Hill, The Prince of Castle Nowhere,* 133; Carlos A. Schwantes, *The Pacific Northwest: An Interpretive History* (Seattle: University of Washington Press, 1989), 196-96, 216-17l; [Seattle] Board of Park Commissioners, *Parks, Playgrounds and Boulevards* (Seattle: The Pacific Press, 1909), 7, 9, 11-12.

[14] [Seattle] Board of Park Commissioners, *Parks, Playgrounds and Boulevards* (Seattle: The Pacific Press, 1909), 57-67. See also, "Long Range Guidelines and Design Improvement Program for the Restoration of the Lake Washington Boulevard—Working Papers," by EDAW Inc, and Walmsley & Co., Inc. for the Department of Parks and Recreation, Seattle, WA, 1986.

Department of Highway Engineering, University of Washington

Meanwhile, with all the enthusiasm for good roads in Seattle, and throughout Washington and the nation, Hill proclaimed his gospel to more influential groups, including the University of Washington Board of Regents. In 1907, he convinced its members to establish a highway engineering curriculum at the University with Lancaster as its chair. The position was the first of its type in the country, and interestingly, Lancaster was one of three faculty members without any collegiate credentials, and a full professor at that! Hill's dream of creating a large supply of highway engineers to improve Washington's road system seemed fulfilled as nearly two hundred students enrolled in Lancaster's first class. They included Frank A. Kittredge and John A. Elliott. Both men studied under Lancaster and within a decade had made their mark on Pacific Northwest roads. In 1909-10, Kittredge located and oversaw construction of portions of what eventually became Washington State Route 8, along the north shore of the Columbia River, near Lyle, in Skamania County. In 1913-14, he located the Pacific Highway in Jackson County, Oregon, near the California State line. Elliott surveyed a route for the CRH in Hood River County and designed the Mitchell Point Tunnel.[15]

Kittredge later became one of the U.S. Bureau of Public Roads' (BPR) best locating engineers, gaining much experience in laying out park roads. By the mid-1920s, he established the alignment for what became Logan Pass on the Going-to-the-Sun Road in Glacier National Park and believed that it would "exhibit the grandeur of the park to the maximum." The National Park Service thought highly of Kittredge and in 1927 promoted him to chief engineer. Meanwhile, Elliott, then an engineer with the BPR, helped draw up a long-term agreement between his agency and the NPS in 1925 to cooperate on park road design and construction. He eventually became the ranking engineer for Region 6 of the BPR (Texas, Oklahoma, Louisiana, and Arkansas).[16]

First International Road Congress, Paris, 1908

In October 1908, Hill the veteran European traveler, sailed for Paris as a delegate to the First International Road Congress (the International Congress on the Adaptation of Roads to the New Means of Locomotion), where he represented the state of Washington and the WSGRA. He brought with him, at his own expense, Lancaster, Seattle Park Department commissioner Thomson, and Henry L. Bowlby, then a fellow engineering faculty member of Lancaster at the University of Washington. All four were good roads' backers and were part of the American

[15]Lancaster was one of 52 professors, associate professors, and assistant professors at the University of Washington. He was one of three who had no collegiate credentials. Many lecturers and instructors held no college degrees. See *Bulletin of the University of Washington, 10th Biennial Report of the Board of Regents of the University of Washington to the Governor of Washington*, 1909, series 1, January 1909, no. 48, 15, 37-41; Tuhy, *Sam Hill, The Prince of Castle Nowhere,* 133; Fahl, 106; and Edmond S. Meany, *History of the State of Washington* (New York: Macmillan Co., 1942) 308.

[16]McClelland, *Presenting Nature: The History of Landscape Design of the National Park Service, 1916-1942*, 109. See "National Historic Landmark Nomination, Going-to-the-Sun Road, Glacier National Park," Susan Begley and Ethan Carr, 1996, pp. 28-31, copy held by the National Historic Landmarks Program, Washington, DC; Carl Nitteberg, "John Arthur Elliott, Life Member ASCE, Died March 3, 1956," obituary, pp. 1-2, copy in the files of Jeanette Kloos, ODOT, Portland.

delegation of twenty, out of 2,150, who attended the Congress. They also toured by automobile much of continental Europe and the British Isles, where they saw first-hand examples of both new and well-tested road building techniques. They hoped to bring back fresh ideas that they might find particularly useful in the Pacific Northwest. Hill had in mind two routes. The first followed the Columbia River's north shore as a cross-state trunk route. The second ran from Canada to Mexico—from Blaine, Washington (north of Seattle) to Portland to San Diego. It eventually became the Pacific Highway.[17]

The four travelers spent much of their time along Germany's Rhine River, looking at the rock retaining walls still there from Charlemagne's time. They were also impressed by local masonry that they saw in Italy. Finally, they were taken with central Switzerland's premier road, the *Axenstrasse* (Axen Street) along Lake Lucerne, between the cantons of Schwyz and Uri. The road dated from 1865 and included massive excavation and a nearly 500-foot windowed tunnel, hewn out of Valangien limestone escarpments. Masonry guard walls and parapets bordered the *Axenstrasse* for much of its length.[18]

The Swiss road truly inspired Hill and he told Lancaster and others that he planned to build a similar highway in the Pacific Northwest. He wanted the world to "'come out and see the beauties of the land out of door . . . [to] realize the magnificence and grandeur of the Columbia River Gorge.'" Hill subsequently made several more trips to Europe to investigate roads and road building techniques.[19]

Upon returning from the First International Road Congress and his investigation of European road building, Hill immediately delved into preparing for the first American Congress of Road Builders that he planned for Seattle in July 1909 to run in conjunction with the Alaska-Yukon-Pacific Exposition. A "Good Roads Building" was even erected as part of the fair to exhibit modern road construction methods. This structure ultimately housed the University of Washington's Department of Highway Engineering.[20]

Hill pressed on with his good roads' campaign in Washington State. Lawmakers created the Office of State Highway Commissioner in 1905 to provide some direction in establishing a statewide road system, but counties were reluctant to give up their jurisdiction over road matters to state officials. Hill and the WSGRA lobbied successfully in 1907 for a practical state aid plan

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[17]Tuhy, *Sam Hill, The Prince of Castle Nowhere,* 133-34; Fred Lockley mentioned that Bowlby went as part of this group, see his *History of the Columbia River Valley, from The Dalles to the Sea* (Chicago: S. J. Clarke Publishing Co., 1928), 831-32.

[18]In 1941, a new motor vehicle tunnel bypassed the windowed tunnel on the *Axenstrasse*. The windowed tunnel section then became a pedestrian facility. Heinrich Hofacker and Herbert Will, "Rock Stablization along the Axenstrasse, Switzerland," *Structural Engineering International* 7, no. 1 (February 1997): 27-28.

[19]*Vom Vierwaldstättersee Nach Dem Berneroberland*, Furka-Grimsal Edition Illustrato (Zurich: Wehrliverlag Kilchberg [1920]), see unpaginated illustrations of the *Axenstrasse*; Tuhy, *Sam Hill, The Prince of Castle Nowhere,* 133-34.

[20]Tuhy, *Sam Hill, The Prince of Castle Nowhere,* 134; E. L. Powers, "Modern Road Building: First Congress of American Road Builders," *Good Roads Magazine*, 4 July 1909; and Organization of Road Builders," *Pacific Builder and Engineer*, 17 July 1909, 271.

for highway construction and improvement. With it came an expanded state highway board, and a commissioner given wide powers and authority to carry out the work.[21]

In 1908, Governor Marion E. Hay sought out Hill to lead an advisory highway board to garner public support for state-directed road improvements. Meanwhile, ardent good roads "nay sayers," who saw roads as a costly extravagance, continually criticized the Hay administration for its role in highway matters, in particular the current highway commissioner's incompetence. In August 1909, on Hill's recommendation, Bowlby became the new highway commissioner.[22]

Henry L. Bowlby in Washington

Bowlby had come to the University of Washington in 1905 as an instructor in civil engineering and became well acquainted with Lancaster who was then designing Seattle's boulevard system. By 1908, Major Bowlby worked with Lancaster in formulating the institution's highway engineering curriculum.

Born on 31 December 1879 in Crete, Nebraska, Bowlby entered the U.S. Military Academy as an 18-year-old after completing his junior year at the University of Nebraska. He never finished his education at West Point, nor was he ever commissioned as an officer in the U.S. Army. Instead, in the spring of 1901, Bowlby was expelled from the Academy amid accusations that he sympathized with fellow classmates who breached the institution's military discipline by engaging in horseplay in the mess hall. Kicked out of West Point, Bowlby and other former cadets headed for Ecuador, where they soon found work laying out railroads. Bowlby honed his skills as a civil engineer and returned to the U.S. in 1904. Along with his compatriots, he refused President Theodore Roosevelt's offer of a military commission. Bowlby instead returned to the University of Nebraska where he earned both a bachelor's degree and a graduate degree in civil engineering. By 1905, he was on the faculty at the University of Washington.[23]

Bowlby seemed a logical choice to lead Washington's road program. His education, and practical experience made him just what Hay was looking for in filling the post. During his tenure, Bowlby put into place several programs and recommended many others to firmly define his department's role as a forward-thinking state highway agency that promoted the design, construction, and maintenance of an efficient and economical highway system for the state of Washington. No one can speculate about how many of the innovations came from Bowlby and how many came from Hill. It is an understatement to say that Hill relished his position as Highway Advisory Board chair, for Bowlby later acknowledged when Hay appointed him

[21]Rindell, 10-18. The law also required that the new commissioner be both a civil engineer and a surveyor. See Rindell, 27-30; and "History of Roads and Highways in the State of Washington," TMs, c.1939, p. 23, held by the Washington State Department of Transportation Library, Olympia.

[22]Hermas John Bergman, "Progressive of the Right: Marion E. Hay, Governor of Washington, 1909-1913" (Ph.D. diss., Washington State University, 1967), 53, 56; *Third Biennial Report of the [Washington State] Highway Commission for the Period Ending September 30, 1910* (Olympia, WA: E. L. Boardman, Public Printer, 1910), preface; Rindell, 35-36, 38.

[23]Fred Lockley, "Prank of West Point Cadet Saves Highway Engineer for Oregon," *Portland Oregon Journal*, 7 June 1914, sec. 5, p. 1; see also *Bulletin of the University of Washington, 10th Biennial Report of the Board of Regents of the University of Washington to the Governor of Washington*, 1909, series 1, January 1909, no. 48, p. 39.

highway commissioner that Hill would be Bowlby's "'boss' and give [him his] orders in road matters."[24]

Bowlby established a modern highway department, but faced strong opposition from citizens who favored county control of road matters. Uproar over Bowlby's activities clearly divided Washington State politics between the WSGRA and its sympathizers, including Hill, and "anti-state aid" forces. Opponents to state-supported highway improvements seized control of the 1910 WSGRA convention in Walla Walla, eroding Hill's and other "Old Guard" domination over the organization. Moreover, in 1911, anti-state aid lawmakers foiled their colleagues' attempts to select a cross-state trunk route before the legislative session ended. Governor Hay chose not to call a special session to sort out the trunk route stalemate and instead turned toward controversy surrounding the highway commissioner. Bowlby finally resigned under pressure in late March 1911, and his actions had a far-reaching effect upon Washington State road building and Washington state politics.[25]

Bowlby's Resignation

Bowlby's resignation and Hay's weakness over calling an extraordinary legislative session infuriated Hill. He threatened to leave the state for Oregon if the lawmakers and Hay did not approve of his Columbia River trunk route, which incidentally ran through his Maryhill ranch, and his failed lobbying efforts directed at his old friend Hay to retain Bowlby further eroded his loyalty. Hill increasingly claimed more authority. It all came to a head in Bremerton in May 1911 when Hill publicly blamed Hay for the state's stagnant road program. He even demanded a recall election to remove the governor from office. Hill was through with Hay. He hoped the climate would improve with a new governor; it worsened.[26]
Even though Hill campaigned vigorously for Democrat Ernest Lister as Hay's political opponent for the 1912 gubernatorial race and saw Hay go down in defeat, Lister's tight money policy ended any hopes for Hill of ever seeing a cross-state route along the Columbia River's north shore. Hill closed up his houses in Seattle and Maryhill and moved to Portland, Oregon, where

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[24] *Third Biennial Report of the [Washington State] Highway Commission for the Period Ending September 30, 1910*, preface; "Bowlby Raps Governor Hay," *Spokane Spokesman-Review*, 11 March 1911, p. 2.

[25] Rindell, 37-42, 58; *Third Biennial Report of the [Washington State] Highway Commission for the Period Ending September 30, 1910*, 5-10, 83-94, Exhibits A and B; "Bowlby Welcomes Probe of Office," *Spokane Spokesman-Review*, 24 October 1910, p. 7; Fahl, 106; "Road Bills Pass as House Giggles After Good Fight," *Seattle Post-Intelligencer*, 5 March 1911, sec. 2, p. 2; "Highway Bills, After Hot Fight, Are Passed by House," *Spokane Spokesman-Review*, 5 March 1911, sec. 1, p. 2; "Two State Trunk Roads," *Spokane Spokesman-Review*, 9 March 1911, p. 2; "House and Senate Clash During the Closing Hours," *Spokane Spokesman-Review*, 11 March 1911, p. 2; "Commissioner's Salary Doubled; Duties Revoked," *Seattle Post-Intelligencer*, 11 March 1911, sec. 2, p. 2. It is confirmed that Hay did go behind Bowlby's back by offering the commissioner post to his subordinates. One of them, however, refused the offer on the grounds of low salary. The other was criticized for lacking the experience required for the post. See "Bowlby Raps Governor Hay," *Spokane Spokesman-Review*, 11 March 1911, p. 2; *Spokane Spokesman-Review*, 12 March 1911, p. 9.

[26] According to the *Seattle Times*, his reply to Hay gave the governor "a graphic description of his feelings." The *Times* added that Hill's reply was "of such a torrid nature that the mail clerks handled the missive with tongs." See, "Hill No Longer Political Friend of State Chief," *Seattle Times*, 26 May 1911, pp. 1 and 5. In 1909-10, Frank A. Kittredge oversaw locating and, with convict labor, construction of a segment of a north shore road along the Columbia River, between Washougal and Lyle, in Clark and Skamania counties. Kittredge's road represented a disconnected portion of a proposed, but unfunded cross-state trunk route between Vancouver and Prosser, Washington. See *Third Biennial Report of the [Washington State] Highway Commission for the Period Ending September 30, 1910*, Exhibit A.

he hoped he could help design and see constructed his cross-state highway along the Columbia River's south shore.[27]

Hill was no stranger to Portland. In 1909, he purchased the Home Telephone and Telegraph Company, a small communications interest that provided automatic dial telephone service to a growing number of Portlanders in direct competition with Pacific Telephone and Telegraph, part of the Bell System. In just a few short years, he became one of Portland's most energetic boosters and in turn lobbied vigorously for popular support for close friend Governor Oswald West's progressive stance on road issues.[28]

Lancaster and Construction of the Maryhill Loops

Meanwhile, as the political debate over highway legislation was underway in Olympia, Hill also pursued independently experimentation in roadway design and construction. He began it as early as 1909, building service roads at his planned Quaker utopian community, Maryhill, and adjacent 7,000 acre ranch along the Columbia River's north shore, some 100 miles east of Portland. But in 1911, with his stock in Washington politics declining, Hill called on his old friend and highway expert, Lancaster, to conduct comprehensive road design studies there. He sought to learn about road drainage, binding materials, and grade requirements in hopes of selling Washington politicians on the idea of undertaking a statewide comprehensive highway construction program. He looked forward to the day when Washington had the best hard-surface road construction anywhere.[29]

Hill spent more than $100,000 of his own money for Lancaster to construct 7.5 miles of asphaltic macadam roads on his Maryhill ranch. The principal route climbed over 1,400 feet from the Spokane, Portland and Seattle Railway siding along the Columbia, near Maryhill, through the Klickitat Hills to overlook south-central Washington's fertile Goldendale Valley. Hill sought to show the world that durable hard-surfaced roads were an economically feasible alternative to rutty summer trails and muddy winter wallows. For a society less reliant on horses and wagons to transport people and freight, and increasingly reliant on automobiles, good roads were needed for efficient movement of traffic. Hill believed that his roads at Maryhill would "serve as a model for asphaltic macadam construction."[30]

Hill believed Lancaster could develop for him the most economical and efficient means for constructing hard-surfaced roads with gradual curves and slight grades. Modern road surface experimentation was in its formative years. Lancaster referred to his experience in Tennessee and with the Lake Washington Boulevard in Seattle. He had also studied European road construction techniques while attending the First International Road Congress, with Hill, in Paris, in 1908. At Maryhill, he faced the real problem of overcoming steep terrain in laying out a

[27]A combination of Bull Moose fever and Hay's status-quo mentality helped Democrats to win in Washington State politics. Bergman, 298; Rindell, 61.

[28]Rindell, 61; Tuhy, *Sam Hill, The Prince of Castle Nowhere,* 117-22, 139.

[29]Tuhy, *Sam Hill, The Prince of Castle Nowhere*, 136-37.

[30]*Third Biennial Report of the [Washington State] Highway Commission for the Period Ending September 30, 1910*," 7-8; "Road at Maryhill," n.p., n.d. [held by Maryhill Museum of Art, Goldendale, WA] [p. 1]; "An Asphaltic Macadam Road at Maryhill, Washington," *Good Roads*, 4 November 1911, p. 245; George Rohnbacher, "Loop Road Paves Way Into State's History Books," *Goldendale Sentinel*, 18 May 1989, p. 1; "An Asphaltic Macadam Road at Maryhill, Washington," *Good Roads*, 4 November 1911, 247.

road from the Columbia's edge to the crest of the Klickitat Hills. The simple, direct route included very steep grades upwards of 20 percent, providing difficult going for the ablest of teams and the most powerful of automobiles, not to mention the need for good brakes in making the descent. Highway authorities at the turn of the century had calculated how much the capacity of animals—horses, mules, or oxen—diminished with the increase in steepness of grades and this Lancaster directly applied to motorized vehicles. He concluded that the optimum grade for roads, taking into account horsepower and gearing, along with braking ability, was something less than 6 percent.[31]

Much as the railroads had done in decades past, Lancaster "developed distance" to hold to a maximum grade by building an alignment that included a series of loops. He also faced the real problem of calculating curves that were gradual enough so that they were not merely "switchbacks," or "zigzags," with extremely tight corners. Instead, his loops consisted of curves with a minimum 100-foot turning radius to allow teams and wagons, and motor vehicles, to traverse them without having to jockey around to proceed onto the next tangent road section.

Early 20th-century road authorities agreed that water-bound macadam roads were far superior to simple gravel roads because of their durability under horse and wagon traffic. They consisted of compacted layers of broken stone, stone dust, and water, which formed a tight long-lasting matrix. Rainfall helped make the roads durable because it washed new dust, created by the abrasion of horseshoes and steel wagon tires moving along the surface, into the crevices. Automobiles, though, wrecked this relationship between steel tires and macadam roads, because their pneumatic rubber tires did not generate the rejuvenating dust. In fact, they carried away any dust that was present on the road surface to the surrounding landscape, thus leaving the macadam roads to come apart. Some experts believed that the macadam road might better stand up to automobile traffic with a simple surface application of tar. But Lancaster sought to find the "recipe" for an "asphaltic-macadam" road for automobile and horse-drawn traffic that water-bound macadam had provided for horses and wagons.[32]

Lancaster sought to develop roads at Maryhill that would serve as models for asphaltic macadam construction. His experiment focused on several different types. In an article presumably penned by Hill, readers were warned that, "THESE ARE DEMONSTRATION ROADS AND ALL MISTAKES MADE IN CONSTRUCTION ARE LEFT TO ***SHOW HOW NOT TO DO IT***." Four sections of experimental road initially consisted of the standard water-bound macadam, but on three of these Lancaster applied wearing surfaces consisting of different asphalt recipes (see Figure #7). He brought in several 1,000-gallon railroad tank-cars of 90 percent

[31]"Roads at Maryhill" [pp. 1-2]; *Third Biennial Report of the [Washington State] Highway Commission for the Period Ending September 30, 1910*, 7-8; Lancaster, "Practical Road Building in Madison County, Tennessee," 335. In 1911 "Permanent Highway Act," which repealed earlier state-aid laws. The Act called for construction of permanent highways along main lines of travel, either beginning at some trade center or being an extension of a road beginning at a trade center. They were to be graded to a width of not less than 16 feet and surfaced with macadam, stone, gravel, or some other durable material for a width of not less than 12 feet. Ideally, grades were not to exceed five percent and in no case more than ten percent.

[32]See "A History of the Washington State Highway Commission, Department of Highways, 1889-1959," held by the Washington State Department of Transportation Library, Olympia, 4; and *Third Biennial Report of the [Washington State] Highway Commission for the Period Ending September 30, 1910*, 7-8.

asphaltic oil from the Standard Oil Company of California. Lancaster eventually found one recipe that he praised for its durability under continuous heavy traffic.[33]

At Maryhill, Lancaster and Hill conducted both pure and applied research in the field of highway engineering. It was at the cutting edge during the infancy of a new science to understand the properties of binding rock and petroleum products in creating durable, long-lasting road surfaces, and it had direct application in the field of highway engineering, both nationally and internationally. The "Maryhill Loops Road" became the first asphalt-covered highway in the state of Washington.[34]

At Maryhill, Lancaster also applied economical and aesthetically pleasing solutions for shoring up roadway fills and providing safety rails and edge of pavement markers along the experimental roads. He used the locally-plentiful volcanic basalt in creating dry masonry retaining walls, wet masonry guard walls, and coping stones, also known as guard rocks.[35]

Lancaster also sought to reduce construction costs by improving upon tried and true excavation machinery then in use. He even designed a special wagon to haul and spread stone and asphalt mixes. It was constructed of steel, unlike the common wooden slat wagon, and could haul four cubic yards, double the ordinary amount. Lancaster's wagon also had special main axles and steel tires arranged to carry most of the weight, while using the same number of mules for power. In addition, the new wagon could spread stone or asphalt evenly and at a much faster rate than the old-fashioned model, thus reducing time and costs and the need for extra crews of men. This wagon design was later used on the CRH.[36]

By 1912, Hill increasingly looked to Oregon and, in particular, its lawmakers and prominent Portland businessmen, to back his pet project of a Columbia River highway. Meanwhile, Lancaster added to his reputation as a scenic road proponent when in December 1912 the Rainier National Park Committee, an organization of Seattle and Tacoma, Washington, promoters, hired him to lobby Congress to complete the park's road system, thus making it accessible to nature lovers and automobile enthusiasts.[37]

After much hard work, Lancaster succeeded in gaining a modest appropriation for Mount Rainier National Park road improvement. But just as important, local newspapers in western Washington covered his work and many soon held him in high regard as one who could gather energy to construct other even greater roads in the Pacific Northwest.[38]

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[33]"Roads at Maryhill" [p. 1-4]; "An Asphaltic Macadam Road at Maryhill, Washington," 245; Rohnbacher, "Loop Road Paves Way Into State's History Books," 1; N. S. Shaler, *America's Highways: A Popular Account of Their Conditions and of The Means by Which They May Be Bettered* (New York: The Century Company, 1896), n.p.

[34]"Roads at Maryhill" [pp. 1-2]; "An Asphalt Macadam Road at Maryhill, Washington," 245. See also, R. H. Thomson, "Recent Progress of Road Building in Washington: The Construction of Maryhill-Goldendale Macadam Road and the Lancaster Tractor," *Pacific Builder and Engineer* 12, no. 20 (18 November 1911): 343-48.

[35]See a photo of masonry guardrail at Maryhill that was similar to those that Lancaster saw in Europe, in "An Asphalt Macadam Road at Maryhill, Washington," 245.

[36]Ibid., 245-46.

[37]Fahl, 107.

[38]Arthur D. Martinson, "Mount Rainier National Park: First Years," *Forest History* 10 (October 1966): 26-33. See also, Arthur D. Martinson, "Mountain in the Sky: A History of Mount Rainier National Park" (Ph.D. diss., Washington State University, 1966), 71-77.

Early Roads in the Columbia River Gorge

By 1913, Hill convinced Oregon lawmakers of the need for a cross-state highway, one that would connect the many small towns along the Columbia River and eventually form a trunk route carrying traffic and commerce to and from Portland and connecting the city with a blossoming interstate road system. The highway's construction represented the cooperation of three county governments, state lawmakers, philanthropic businessmen, and the general public at a time when local control over local issues was the preferred form of government.

It was not difficult to persuade Oregon lawmakers of the road's need, for as early as the 1850s, individuals attempted to conquer the Columbia River Gorge's miles of steep basalt. No one had yet succeeded. Pioneers who followed the Oregon Trail in the 1840s reached The Dalles after traveling west nearly 2,000 miles from St. Louis. Only then did they face the most difficult part of their journey—rafting the Columbia River more than 70 miles to the Sandy River delta where they reassembled their wagons and followed a trail to Oregon City. The Gorge was the obstacle. In 1845, Samuel Barlow carved out a primitive road from The Dalles to Oregon City, heading south around Mount Hood. His trail, however, still made for an arduous overland journey, which was more difficult than anything the pioneers had encountered in crossing the continent (see Figure #5).

The first wagon road in the Gorge ran from the town of Bonneville to the site of the future Cascade Locks—a distance of six miles—and was completed in 1856. It climbed to an elevation of over 400 feet on steep grades around a portage at the Cascades of the Columbia River. This road only ran a short distance, however, and met the needs of a select few. Journeys on it, carrying supplies from Fort Vancouver to men stationed east of the Cascade Mountains, proved onerous. By 1872, the Oregon legislature designated $50,000 for building a wagon road from the mouth of the Sandy River, 18 miles east of Portland, through the Gorge to The Dalles. The money was soon expended and four years later another $50,000 was appropriated. Even though the road was completed, travel on it proved difficult. The alignment was crooked and narrow with heavy grades, often exceeding 20 percent. "The Dalles-to-Sandy Wagon Road," was never really practicable for travel.[39]

Only in 1882 was the Gorge accessible with a continuous overland route when the Oregon Railway and Navigation Company (ORN) constructed a water-level track from Portland to The Dalles. It served the company and its successor, the Oregon-Washington Railroad and Navigation Company (OWRN), as the mainline to the grain rich Columbia River basin and plateau. For the next thirty years, the line provided the only real alternative to steamboats for travel along the river. By the first decade of the 20th century, with the advent of the automobile, the widespread Good Roads' Movement came to Portland. Enthusiasts called for a new road through the Gorge to the town of Hood River, some 60 miles east of Portland. One even paid to survey a 16-foot-wide road with grades nearing 17 percent. Multnomah County commissioners

[39]See Stephen Dow Beckham, "'This Place Wild': An Historical Overview of the Cascade Area, Fort Cascades, and the Cascades Townsite, Washington Territory," for the U.S. Army Corps of Engineers, Portland District, 10 April 1984, 93-98; Samuel Christopher Lancaster, *The Columbia: America's Greatest Highway through the Cascade Mountains to the Sea* (Portland, 1916), 102-06; Rick Minor and Stephen Dow Beckham, "Cultural Resource Overview and Investigations for the Bonneville Navigation Lock Project, Oregon and Washington," Report to the Portland District, U.S. Army Corps of Engineers, under Contract No. DACW57-83-C-0033, Heritage Research Associates Report No. 29, 22 June 1984, 18-20.

moved forward with the project in 1911, favoring a 20-foot roadway and grades nearing 9 percent. The route proved a good first try, but county forces constructed several miles of the road which, in reality, was of little improvement over the 19th-century route that preceded it. Work ceased when the county ran into difficulty concerning right-of-way with the ORN. The rail company had naturally located its line on the best alignment, and even over parts of the 1872 road. It sought gentle grades and found them closest to the river's edge and away from the nearby cliffs. Although the county eventually negotiated a right-of-way agreement with the ORN, it seemed inevitable that the road would be costly to construct and without firm support from the public, work on it ceased.[40]

Meanwhile, in 1912, Oregon Governor Oswald West had been experimenting with convict labor in building roads in southern Oregon. Portland lumberman and good roads' enthusiast Simon Benson donated $10,000 to fund a labor camp to construct a road across Shellrock Mountain, a large unstable talus slope in Hood River County in the Columbia River Gorge. Many regarded this landform as the supreme obstacle, a barrier to traffic on any route through the Gorge. It was so impassable for pioneers that they stopped just east of the slope to make rafts to float the Columbia to the Cascades, where they could portage. Attempts were made to build a road across Shellrock Mountain, but they always failed within a short time.[41]

Governor West's prison crew built a road around the mountain's base and proved for the time being that Shellrock Mountain could be conquered. The project also brought an injection of optimism for constructing a new motor route through the Columbia River Gorge. Many also saw it as a Progressive Era attempt at using convict labor by teaching the prisoners a useful skill. Even though the project ultimately failed, it was not for lack of trying. Instead, it called attention to the need for comprehensive engineering of a route through the Gorge. The endeavor also marked the beginning of an all out effort at substantial roadwork between Portland and The Dalles.[42]

Meanwhile, Hill desperately wanted to construct a highway in the Columbia River Gorge. With Lancaster's experiments at Maryhill complete, he had compelling evidence that this road and others could be built with proper engineering and at a reasonable cost to taxpayers. He enlisted a corps of influential Portland businessmen and fellow good roads' proponents to campaign for a Gorge road. They included Julius Meier, Portland department store proprietor and later Governor of Oregon; Henry Pittock, publisher of the *Oregonian* newspaper; C. S. "Sam" Jackson, publisher of the *Oregon Journal* newspaper; Rufus Holman, Multnomah County Commissioner and later U.S. Senator; and Simon Benson. Hill promoted the project with his usual zeal. According to C. Lester Horn, another Portlander involved in the campaign, Hill sold the concept of a Gorge highway with the "publicity, political maneuvering and strategy" he was noted for in his previous good roads' campaigns. Hill believed it was a pity that all the beautiful waterfalls, rock formations, and forests along the Columbia River were accorded only quick glances from train passengers traveling along the ORN's main line. But more importantly, he perceived that a good motor route paralleling the rail line through this magnificent splendor

[40]Ronald J. Fahl, "S. C. Lancaster and the Columbia River Highway: Engineer as Conservationist," *Oregon Historical Quarterly* (June 1973): 108-09; Bowlby, "The Columbia Highway," 124; Lancaster, *The Columbia: America's Greatest Highway*, 109.

[41]Bowlby, "The Columbia Highway," 124; Lancaster, *The Columbia: America's Greatest Highway*, 110.

[42]Fahl, "S. C. Lancaster," 109; Thomson, "The Columbia River Road," 693-98.

would "prove an irresistible magnet which would draw more people to the Pacific Northwest" and "more traffic for the railroads, both passenger and freight."[43]

During the November elections in 1912, Oregonians were confused by a multitude of good roads' measures and voted down the lot. By then, Oregon was the last of the far-western states to create a state highway department and consequently it was far behind its neighbors, especially California and Washington, in organizing some sort of comprehensive highway plan. According to one journalist of the time, C. E. Fisher of *Sunset Magazine*, Oregonians "realized their mistake and hoped for favorable legislative action." Road conditions in Oregon were primitive. With 37,000 miles of roads in the state at the time, only 10 percent were hard surfaced to serve the 12,000 automobiles already in Oregon. Bad roads severely limited any travel outside Pacific Northwest cities.[44]

Hill took advantage of the situation. Determined to impress lawmakers with the advantages of good roads and ready with the life-size models at his Maryhill, Washington, estate, he invited the entire Oregon legislature as his guests there in February 1913. While traveling by special train through the Gorge from Portland, Hill pointed out to them in the Gorge what he considered the world's "blue-ribbon scenery." He also presented an illustrated lecture on road building, utilizing slides he had prepared from his trips to Europe, and showed them the Maryhill Loops. Evidently, Hill's piece of salesmanship was convincing. Shortly after their return to Salem, the lawmakers created the Oregon State Highway Commission. This was their first step towards initiating a statewide comprehensive road plan that included the Pacific Highway connecting Portland with Seattle and Los Angeles, a central Oregon route from The Dalles southward to the California border, and a Columbia River highway from Portland to The Dalles.[45]
In addition to promoting an extensive statewide road-building campaign, lawmakers charged the new highway commission with cultivating local support for road construction bonds, since it had no construction budget of its own. At Hill's insistence, the commission hired Henry L. Bowlby, a proven mover in regional road matters, as state highway engineer to oversee development of a statewide trunk route system. Hill then turned to Multnomah County, where in July, Commission Chair Rufus Holman led the formation of a county advisory board on roads and highways. Among others, members included Amos S. Benson (Simon Benson's son) and Sam Jackson. Hill's timing was perfect, for previously, a group of "mossbacked" detractors had

[43]Lewis L. McArthur [untitled paper on the Historic Columbia River Highway], 18 March 1986, rev. 21 November 1990, 7, copy held by author; C. Lester Horn," Oregon's Columbia River Highway," *Oregon Historical Quarterly* 66, no. 3 (September 1965): 258-59.

[44]California created its highway department in 1895. Washington created its highway department in 1905. Fisher, "Interesting Westerner; A National Road-Builder," 542-43; *First Annual Report of the Oregon State Highway Engineer* (Salem: State Printing Department, 1914), 17; Horn, "Oregon's Columbia River Highway," 255; Fahl, "S. C. Lancaster," 108-09; Bowlby, "The Columbia Highway," 124.

[45]Fisher, "Interesting Westerner; A National Road-Builder" *Sunset, the Pacific Monthly* 31 (September 1913): 542-43. In an *Oregon Journal* article dated 13 August 1913, Hill exclaimed that "there are 30 Switzerlands in Oregon." See Fahl, "S. C. Lancaster," 114. Tuhy, *Sam Hill, The Prince of Castle Nowhere*, 140-41. The routes that Hill envisioned for the state system are still in use. The Pacific Highway was later renamed US 99. More recently, Interstate 5 took over as the primary north-south route from Portland to the California border. The Dalles—California Highway became US 97. In more recent years, 64 miles running south from The Dalles, was re-designated US 197, with an alternate route to Biggs, 20 miles east of The Dalles on the Columbia River, numbered as US 97. From there, it crossed the river and used a portion of Lancaster's experimental roads on Hill's estate to climb the Klickitat Hills and enter south-central Washington's Goldendale Valley. The Washington State Department of Highways bypassed the Maryhill Loops Road shortly after World War II with a new, sweeping grade.

dominated Multnomah County government and did not sympathize with good roads' promoters. Hill had induced Holman and other good roads' enthusiasts to seek commission seats. They won the election and were able to advance Hill's cause. The Advisory Board met with the county commissioners in late August 1913 at the Chanticleer Inn, a country restaurant some twenty miles east of Portland, high atop a cliff overlooking the Columbia River Gorge. Holman, Benson, Jackson, and others convinced a majority of the county commissioners to support the highway's construction through the Gorge. In addition, they recommended that the commissioners hire Samuel C. Lancaster to supervise the project. Pacific Northwest road building took a great step forward when Hill, Lancaster, and Bowlby were together once again.[46]

Julius Meier was convinced that Lancaster had the experience and know-how to secure "the best construction at the minimum cost." The commissioners hired him as consulting engineer at a very good salary. But William L. Lightner opposed employing Lancaster because he believed that the engineer's recommendation for a road with high standards was unneeded and expensive. "Nay sayers" like Lightner lost out to others who saw high-quality taxpayer-supported improvement projects as worthy efforts. Portlanders at that time only had to look to the Lake Washington Boulevard and Mount Rainier road-building activities as ways of solidifying Puget Sound as the center of the Pacific Northwest. Improving access to Portland's hinterlands was good for the city. Citizens from as far away as eastern Washington saw a highway in the Columbia Gorge as worthwhile because it might reduce their reliance on Seattle and Tacoma for commerce. This new route could also improve social cohesiveness between Portland and the surrounding area. To remove the road's possible divisiveness from county politics, the majority of commissioners who supported it asked the Oregon State Highway Commission to take charge of laying out the route, with Lancaster's guidance. They also appropriated $75,000 from county coffers as seed money to finance the highway. Lancaster became an assistant state highway engineer dedicated to this project and received generous compensation.[47]

The Columbia River Highway in Multnomah County, Oregon
Surveying Begins, Multnomah County, September 1913

Lancaster had a difficult task ahead in mapping out the Columbia River Highway (CRH) through Multnomah County to the Hood River County line. He faced many challenges that would have eclipsed the skills of most civil engineers of the day. Since much of the highway's alignment from Troutdale to Chanticleer Inn followed a portion of the county's extensive market road system, Lancaster began his survey just east of the restaurant, at the point where Larch Mountain Road begins a grade. Standing there, he "realized the magnitude of [this] task and the splendid opportunity [it] presented."[48]

From September 1913 through January 1914, Lancaster and his crews projected a line for the highway for some 21 miles east of Chanticleer. He founded it on "easy grades not exceeding 5 percent and graceful curves." He had established tight design parameters for the highway. These included a minimum 200-foot turning radius on curves and a maximum 5 percent grade.

[46]Fahl, "S. C. Lancaster," note 20, pp. 135-36; Bowlby, "The Columbia Highway," 124; Horn, "Oregon's Columbia River Highway," 261; Fahl, 111.

[47]Fahl, "S. C. Lancaster," 111-12; Lancaster, as assistant state highway engineer, was paid $450 per month. Bowlby, as state highway engineer, received $3,000 per annum ($250 per month).

[48]*Oregon Journal*, 3 January 1915, pic. supp., p. 2, as quoted in Fahl, 114.

In rare cases, he allowed a turning radius of 100 feet, but lowered grades by 1 percent for every 50-foot reduction from 200 feet. Lancaster also created a roadway width averaging 24 feet, with 18 feet of macadamized and later asphalt travel lanes, and two 3-foot gravel shoulders. He evidently drew on many sources to establish the design criteria for the CRH. Previously, Lancaster stuck to a standard of 6 percent grades in Tennessee and on the Maryhill Loops Road. He also used a 100-foot minimum curve radius at Hill's estate. The 5 percent standard evolved from the 1911 *Permanent Highway Law* in Washington. Drafted while Hill was chairman of the Washington State Highway Advisory Board and Bowlby was highway commissioner, it defined a "Permanent Highway" as an improved road not less than sixteen feet wide and with no grade exceeding 5 percent.[49]

Parts of the proposed route in Multnomah County required a complete topographic survey. Lancaster sought to find the most practicable route, but at the same time he hoped to locate the road "so as to take advantage of the magnificent landscape and natural beauty of the region." He took great pains to secure the best alignment for the road, and associated trail system, because he was convinced that this was not "an ordinary country highway." Lancaster believed that he was opening up the Columbia Gorge's "hidden waterfalls and mountain crags, dark wood, fern-clad coves, and all else that a wise creater [*sic*] chose to make for the pleasure and enjoyment of the children of men." His rationale fell in line with the thinking of the great 19th-century landscape architect Andrew Jackson Downing, who promoted curvilinear lines and gradual, graceful curves in aligning roadways and trails to follow the land's natural contours, taking visitors to the natural points of interest (see Figure #6). This is part of Downing's philosophy of landscape preservation that greatly influenced the thinking of Frank A. Waugh, Henry Hubbard, and others who, by the 1920s and 1930s, were helping to set National Park Service (NPS) policy in designing and maintaining its growing road and trail systems.[50]
In Lancaster, the CRH's promoters had found an engineer with a rare blend of technical skill and romantic appreciation for nature. Deeply religious, his philosophy coincided with that of John Muir and other preservationists who revered the wildness of God's unspoiled work. Lancaster even wrote that, "I am thankful to God for His goodness in permitting me to have a part in building this broad thoroughfare as a frame to the beautiful picture He created." It was widely believed by early-twentieth-century progressives that natural surroundings could help heal some of the ills of urban life. Crowded city dwellers needed access to the "wilderness" for social and

[49]Lancaster to A. S. Benson, 7 February 1914. See William R. Roy, "Washington's State Highways and Highway Department," *Municipal Journal* 39, no. 10 (9 September 1915): 344. George Goodwin's proposed "Transmountain Highway" in Glacier National Park, called for a 20-foot graded road, grades as high as 8 percent, and a maximum 50-foot turning radius on curves. Frank A. Kittredge's 1924 survey adopted for the Logan Pass section of the Going-to-the-Sun Road included a grade maximum of 6 percent, with 100-foot radii for open curves and 200-foot radii for blind curves. Kittredge's standards for the GTTSR are in line with Lancaster's standards for the HCRH, which were established in 1913. See "National Historic Landmark Nomination, Going-to-the-Sun Road, Glacier National Park," Susan Begley and Ethan Carr, 1996, pp. 23 and 29-30.

[50]S. C. Lancaster to A. S. Benson, 7 February 1914, box 4, folder "Multnomah County, 1914," RG 76A-90, Oregon State Archives, Salem; *Oregon Journal*, 3 January 1915, picture supplement, p. 2; Fahl, "S. C. Lancaster," 114; Linda Flint McClelland, *Presenting Nature: The Historic Landscape Design of the National Park Service, 1916-1942* (Washington, DC: Government Printing Office, 1993), 11-19, 40-41, 106-108; Waugh was Downing's strongest 20th-century follower. McClelland believed that Hubbard and Theodora Kimball's volume, *An Introduction to the Study of Landscape Design*, (New York: Macmillan, 1917), was "the single most influential source that inspired national and state par designer in the 1920s and 1930s." See McClelland, 45.

spiritual health. In the Columbia Gorge, as Lancaster described it, "Tired men and women with their little children may enjoy the beauty of nature's art gallery and recreate themselves."[51]

He was so taken by Multnomah Falls, some 30 miles east of Portland, for instance that the words he wrote to describe it erupted from his heart and soul. He believed that the 620-foot cascade was ideal, "It is pleasing to look upon in every mood," he wrote, "it charms like magic, it woos like an ardent lover; it refreshes the soul; and invites to loftier, purer things." Lancaster envisioned Multnomah Falls as a destination for motorists much as it had been for steamship passengers and train travelers in previous decades. He saw Multnomah Falls as the single most important natural feature in the Gorge.[52]

According to historian Ronald J. Fahl, "For weeks, [in Multnomah County] Lancaster and his cohorts literally pulled themselves over the rocky and wooded terrain—taking photographs, drawing up blueprints, and always planning for a roadway that would blend subtly with the environment." Roy A. Klein, locating engineer for the Wasco County portion of the CRH and later Oregon State Highway Engineer during the 1920s, believed that in doing this, Lancaster laid out a road that met or surpassed "the highest engineering standards of the age." Construction began in Multnomah County in October 1913, once the first several miles had been located and right-of-way secured. Five work camps were initially set up to house and feed the 600 to 700 men who provided labor on the route. Most were near the OWRN mainline to take advantage of timely transportation of supplies from Portland.[53]

Throughout Multnomah County, Lancaster relied on a well-known and well-liked local lumber baron, John B. Yeon, to coordinate the work crews' every effort. As a champion of the road, Yeon showed an early interest in its construction. He accepted the county commissioners' request to become "Roadmaster," and for two years, assisted by Simon Benson's son Amos, he managed the gangs of several hundred who worked the picks and shovels, upwards of 2,200 men by the completion of work in Multnomah County. Yeon was the perfect choice for this role because he had proven his abilities at directing crews of lumbermen to work efficiently and conscientiously under less than ideal and often harsh environments. Lastly, Yeon was well off financially and took a token compensation of one dollar per year for his efforts. His commitment to good roads in Oregon continued with his appointment to the Oregon State Highway Commission in the early 1920s.

Drainage

The CRH was constructed with a comprehensive urban-like drainage system to preserve the road itself from destruction. Because of the Gorge's heavy rainfall, water is an ever-present problem for much of the year along the CRH between Troutdale and Hood River. Often, the road was

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[51]Diane Ochi, "Columbia River Highway: Options for Conservation and Reuse," Columbia River Highway Project, Cascade Locks, OR, 1981, 17; Lancaster, *The Columbia: America's Great Highway*, 2d. ed. (Portland, 1916) [5]. See also Thomas R. Cox, *The Park Builders: A History of State Parks in the Pacific Northwest* (Seattle: University of Washington Press, 1988), .

[52]John Eliot Allen, *The Magnificent Gateway: A Layman's Guide to the Geology of the Columbia River Gorge*, Scenic Trips to the Northwest's Geologic Past—No. 1 (Forest Grove, OR: Timber Press, 1979), 89-91; Samuel Christopher Lancaster, *The Columbia: America's Great Highway through the Cascade Mountains to the Sea*, 2d ed. (author, 1916), 71, quote.

[53]Fahl, "S. C. Lancaster," 115, 138.

crowned to encourage drainage. Other means were necessary to take away storm water and hillside drainage, to prevent it from accumulating at the edge of the roadway, where it might undermine the surface and subsurface layers.

Lancaster designed a drainage system that had more in common with the city setting of Seattle's Lake Washington Boulevard than with rural Multnomah County. It was one that included concrete curbs, side drains, and gutters along the edge of pavement to channel water to drop inlets and tiling under the roadbed to empty runoff into local streams. In other instances, he employed simple French drains. Some of these gravel-filled trenches incorporated porous drain tiles to accommodate larger runoffs. Finally, where Lancaster anticipated the largest amounts of hillside flows, he had masons build box culverts to safely pass the water under the roadway. Lancaster's arrangement of drainage structures on the Figure-Eight Loops and elsewhere included at least 9,000 feet of gutter. His system was purposely elaborate, but yet very functional because each element helped direct rainfall and runoff away from the road surface in an orderly and efficient manner. Though costly to construct, the drainage system's use realized a reduction in overall projected outlays for the CRH (see Figure #7).[54]

Oneonta Tunnel, HMP 34.3

Lancaster and his staff faced a great challenge in conquering Oneonta Bluff, a northward protruding basalt formation just east of Oneonta Gorge. It presented an obstacle to constructing the road any farther east towards the Multnomah County line. The railroad had already taken the only available land skirting around the formation's north face. During late 1913, the Multnomah County Road Department called for bids to excavate the Oneonta Tunnel. What appeared as a simple 125-foot straight bore was anything but easy to create. The Columbia River basalt found there had frequent cleavages and was commonly known as "dice" rock because it broke up into small fragments when disturbed. To compound this problem, even a narrow 20-foot-wide bore, like the proposed Oneonta Tunnel, left only 18 feet of natural rock between its outer wall and the cliff face which abutted the OWRN main line. The railroad company's worst fear was that in boring the tunnel, crews might cause the entire basalt formation to come crashing down onto the track, closing the mainline indefinitely. Lancaster, though, devised a successful plan to stabilize the dice rock prior to boring the tunnel. He instructed crews to inject concrete into the crevasses to hold together the basalt and permit them to carry out their work with minimal rock fall. By late spring 1914, the tunnel was completed and subsequently lined with timber sets and lagging because of rock fall issues. With Oneonta Bridge open a few short months later, the CRH was passable to Horsetail Falls (see Figure #11).[55]

Oneonta Tunnel's narrow width presented dangers for traffic. Because of the formation's delicate nature, widening the bore was not possible. By 1948, the OWRN agreed to move its mainline on fill material and allow the highway department to reroute the CRH around Oneonta Bluff. The tunnel was then backfilled and exists in a mothballed state.

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[54]Interviews, Pierce and Hadlow with Fix, Summer 1995; Brady, "The Columbia River Highway in Oregon," 168. Experiments at Maryhill, just a few years before, showed Lancaster that adequate sub-base preparation was essential to a first-class, long-lasting road.

[55]"Pile Trestle over Horse Tail Creek," Drawing No. 278, in Bridge No. 4543, Maintenance Files, Bridge Section, ODOT, Salem; K. P. Billner to S. C. Lancaster, Consulting Engineer, 30 June 1914, in "Columbia River Highway—K. P. Billner, Resident Engineer, 1914," 2/21, Mss 2607, Oregon Historical Society, Portland; "Reinforced Concrete Bridges on the Columbia Highway in Multnomah County," 189.

Even though the roadway itself had been completed by late 1914 from Chanticleer Inn to Eagle Creek, in east Multnomah County, a distance of about 20 miles, the bridges, viaducts, and masonry work often lagged behind. In part, this was because of the separation of duties. Yeon had completed the grubbing and clearing of Lancaster's alignment and oversaw the laying down of sub-layers and top layers of a macadam road. The state highway department, however, was responsible for designing and building structures, and it took time to complete plans, seek bids, and award contracts. Funding uncertainty was ever present. In November 1914 for instance, work on masonry structures halted because resources were exhausted.[56]

Bridges on the Columbia River Highway in Multnomah County, Oregon

With engineering, economics, and aesthetics in mind, a handful of designers under the guidance of bridge engineers Charles H. Purcell and his successor, Conde B. McCullough, created the unique spans found along the CRH. Unlike the one-size-fits-all, run-of-the-mill steel truss bridges that were popular at the time, each structure was tailor-made for its location. Reinforced concrete, a relatively new bridge construction material, was the medium of choice for its durability and plasticity.

The Columbia River Gorge's natural outcroppings often served as ideal foundations for reinforced-concrete arches. Reinforced-concrete girder spans resting on series of bents dispersed loads at crossings with poor pier foundations. Each site for the larger bridges had a character that demanded custom structures to take advantage of natural features or to compensate for natural deficiencies. In addition, the many bridges along the CRH combined forward-thinking engineering with aesthetics. As a result, the highway possesses one of the best early 20th-century collections of reinforced-concrete bridges—an ensemble of unique, seemingly fairytale spans, often nestled in garden-like settings.[57]
Purcell's first designer was Karl P. Billner, formerly employed by the Washington State Highway Commission as a resident engineer for Henry L. Bowlby. By September 1914, Purcell had hired Lewis W. Metzger as a second designer. A 1909 Cornell University graduate, Metzger had worked for several engineering concerns in Portland, prior to a short stint in Vancouver, British Columbia.

Crown Point Viaduct, HMP 23.9

Lancaster saw Crown Point as a destination for travelers. But the terrain required ingenuity to create a structure to help carry the CRH around the top of the basalt formation. There was only

[56]J. B. Yeon to H. L . Bowlby, 24 November 1914, folder "Multnomah County, 1914," box 4, 76A-90, Oregon State Archives, Salem; S. C. Lancaster to J. A. Elliott, 4 October 1914, ibid. See also, Lancaster, "The Columbia River Highway in Multnomah County," 66-67.

[57]Purcell served as Oregon State Bridge Engineer from 1913 to 1916. Born in 1883, he earned a B.S. in Civil Engineering from the University of Nebraska in 1906. He worked briefly for the Union Pacific Railroad before devoting several years to mining companies in the United States and South America. He came to the Pacific Northwest in 1911 and joined the OSHD two years later. Purcell left the state agency to work briefly as a consultant before joining the U.S. Bureau of Public Roads in its Portland office. He moved to California in 1927, where he became the state highway engineer. Purcell is most widely known for his work as chief engineer for the San Francisco-Oakland Bay Bridge, which opened in 1936. See Dwight A. Smith, et al, *Historic Highway Bridges of Oregon*, (Portland: Oregon Historical Society Press, 1989), 242, for a succinct biographical essay on Purcell.

enough room on Crown Point to spiral the driving lanes around the top of the bluff and continue eastward to Latourell Falls, but no space for a sidewalk or railing. Billner created a sophisticated viaduct system to support the sidewalk along the road cut's outer edge. Because of terrain, a series of concrete columns, of varying lengths, supported the 7-foot sidewalk's outside edge, and accompanying concrete parapet wall and lamp standards. The inside edge rested on the top of a masonry wall. Square inclined struts tied together the structure at the bases of the outside bents and the top of the masonry wall to improve lateral stability. Billner showed his expertise in structural engineering here and with similar braced concrete viaducts on the CRH near Multnomah Falls.[58]

An octagonal reinforced-concrete and masonry observation building and public comfort station, Vista House, was constructed on the horseshoe-shaped center space in 1918 as a memorial to Oregon Pioneers. Here, travelers were offered modern, hygienic restrooms and panoramic views of the Columbia River.

Latourell Creek Bridge, HMP 26.1

East of the Figure-Eight Loops, the best crossing for the CRH that Lancaster found over Latourell Creek was just below Latourell Falls. In studying the site, Billner noted that foundation conditions at the 300-foot-wide crossing were poor—underlying bedrock covered with 25 to 50 feet of silt or drift sand. This made a substructure for a "heavy type" of bridge very expensive. Instead, Billner designed a lightweight reinforced-concrete three-span trussed arch for the crossing. His three 80-foot spans could easily rest on the soft foundations because of the bent and bracing systems that he used to disperse loads. In general, it followed the principles that acclaimed French engineer Armand Considère had only recently perfected. Billner did everything he could to make his bridge lightweight, but sturdy. He used arch ribs instead of barrel arches, spandrel columns with diagonal bracing instead of solid spandrel walls, and braced two-legged bents instead of solid concrete piers. The deck was completed in one continuous pour lasting 30 hours (see Figures #12 and #13).[59]
Billner believed that his design for the Latourell Creek Bridge (HAER No. OR-24) was cost efficient even with all of its formwork, because of the savings in concrete. When completed in 1914, Latourell Creek Bridge was billed as the lightest concrete structure of its size in the country. Billner also designed for this bridge a railing system of delicate precast concrete spindles and a plaster concrete cap. This became one member of the family of railing designs seen throughout the CRH. Billner was satisfied with his design for this bridge because he believed that the structure reached "a state of harmony with the surroundings."[60]

Shepperd's Dell Bridge, HMP 27.4

A little over a mile east of Latourell Creek, Lancaster located the crossing of Young Creek over a 100-foot gorge. He discovered the route across this chasm only "when it seemed impossible to

[58]See Robert W. Hadlow, "Crown Point Viaduct, HAER No. OR-36-C," Historic Columbia River Highway Recording Project, Summer 1995.

[59][K. P. Billner] "Reinforced Concrete Bridges on the Columbia River Highway in Multnomah County," TMs, folder "Multnomah County Bridges, 1914, box 2, RG 76A-90, Oregon State Archives, Salem, 1-3; [untitled manuscript by K. P. Billner] folder "Multnomah County Bridges, 1914, box 4, RG 76A-90, Oregon State Archives, Salem.

[60]Ibid.

get by the point of a high mountain any other way." Young Creek was later renamed Shepperd's Dell, after George Shepperd, a man of modest means who gave the land surrounding it as a memorial park to his wife, for the public to enjoy. Lancaster had attempted to find a route east of Latourell Creek to replace an old trail, used by locals, with hairpin turns and steep grades. Down below this stretch, as usual, was the OWRN mainline at water level. After studying the sheer cliffs, Lancaster found that by hugging the road around the cliff face on ledge and masonry walls, and by cutting back the rock in the form of a half-tunnel, at one point, he could carry the road around the mountain at about 140 feet in elevation. The only obstacle was the creek's small gorge.[61]

Fortunately, Billner found very favorable bridge foundations at the crossing. He constructed the Shepperd's Dell Bridge (HAER No. OR-23) as a traditional reinforced-concrete deck arch anchored to basalt outcroppings. As an aesthetic component, Billner employed semicircular arched-top spandrel columns above the two parabolic arch ribs, and on them rested the deck. To better distribute the deck loads to the arch ribs at mid-span, however, he created more traditional looking spandrel walls that functioned as solid girder-like structures. Billner also created a spindle-and-cap railing design similar to the system used on the Latourell Creek Bridge. Lancaster laid out a short masonry-railed pedestrian trail leading to the stream.[62]

During the first few decades of the 20th century, the great Swiss bridge designer Robert Maillart and others experimented with reinforced concrete in attempts to create light and airy, but durable arched structures. Billner's work here and at Latourell Creek, though different in style from Maillart's, are important because they helped advance the field of economic reinforced-concrete arch bridge construction.

Bridal Veil Falls Bridge, HMP 28.4

The crossing chosen over Bridal Veil Falls and Creek posed significant difficulties. For decades, the Bridal Veil Lumber Company had operated a mill high above the village on Larch Mountain at a location named Palmer. It rough cut timber there and sent the cants down flumes to planing mills at Bridal Veil. From there, the company shipped finished lumber to markets by rail. Billner was limited in his locations for spanning Bridal Veil Falls Creek because the lumber company had taken choice land between Bridal Veil Falls and the rail siding for its mills. In addition, topography east of Bridal Veil Falls prevented Lancaster from locating the highway anywhere but almost directly over the cataract. To complicate matters, the lumber company used the stream to power its three flumes, which were adjacent to the falls[63]

Billner was faced with creating a structure in a poor location over several obstacles. For the Bridal Veil Falls Bridge (HAER No. OR-36-E), he designed a relatively unique type of reinforced-concrete deck girder span. Billner created a 110-foot skewed structure in which the parapet walls served as continuous elastic beams. The transverse deck support members actually

[61]Lancaster, "The Columbia River Highway in Multnomah County," 62.

[62][untitled manuscript by K. P. Billner] folder "Multnomah County Bridges, 1914, box 4, 76A-90, Oregon State Archives, Salem, 5.

[63]Lancaster, "The Columbia River Highway in Multnomah County," 62; "Reinforced Concrete Bridges on the Columbia Highway in Multnomah County," 188; [untitled manuscript by K. P. Billner] folder "Multnomah County, 1914," box 4, RG 76A-90, Oregon State Archives, Salem, 5-6; K. P. Billner, "Design Features of the Various Types of Reinforced Concrete Bridges Along the Columbia River Highway in Oregon," 123.

functioned as deck girders. The span was offset to accommodate the creek. In addition, the 60-foot main span was in reality three shorter spans incorporating two pairs of intermediate bents that broke away 30 degrees from the vertical to connect with the bases of the piers and span the width of the falls. All of this engineering was necessary to maintain vertical clearances that the Bridal Veil Lumber Company required for its flumes. Indeed, while the diagonal bents appeared to the casual observer as simple bracing, they were part of Billner's solution to conquering a stream crossing laden with physical constraints. The parapet walls might seem over-built to the untrained eye until it was understood that they were 20 inches thick to function as continuous elastic beams, carrying loads to the columns below.[64]

West and East Multnomah Falls Viaducts, HMP 31.9 and HMP 32.3

At river level the CRH passes by Multnomah Falls, which many observers believe is the most magnificent of all waterfalls along the Columbia. But both east and west of the falls there seemed nowhere suitable for a roadbed. The OWRN mainline had taken nearly all of the available land between the basalt cliffs and talus slopes, and the nearby river. Billner and Lancaster saw it as nearly impossible to pass a road through the area and maintain the standards established for the CRH. Lancaster solved similar problems by constructing the road on fill, or with sensitive cliff-face cuts, and shoring it up with retaining walls. But near Multnomah Falls, the unstable talus slopes made this impracticable. Even minimal cutting and filling at the toe of these mountainsides, held together only by underbrush and timber, might provoke landslides of talus and debris that could cover both the road alignment and the OWRN mainline.[65]

Billner created viaducts—one for each approach to the Multnomah Falls area—which rested on unequal-length columns, anchored to the slopes and nearly overhanging the OWRN right-of-way. They were very similar in design to the Crown Point Viaduct. Billner placed these structures with a minimum of disturbance to the fragile slopes. In the summer of 1914, the Pacific Bridge Company of Portland constructed the 400-foot West Multnomah Falls Viaduct (HAER No. OR-36-G) and the 860-foot East Multnomah Falls Viaduct (HAER No. OR-36-J) out of 20-foot reinforced-concrete girder spans. Billner employed his diagonal bracing system, perfected on the Crown Point Viaduct, between the footings of the uphill and downhill bents, to add structural rigidity and prevent them from slipping down the slope. The key to maintaining the required setback from the OWRN right-of-way was to elevate the structures high enough up the hillside to maintain safe clearances for railway cars.[66]

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[64]Billner, "Design Features of the Various Types of Reinforced Concrete Bridges Along the Columbia River Highway in Oregon,"123; "Reinforced Concrete Bridges on the Columbia Highway in Multnomah County," 188; [untitled manuscript by K. P. Billner] folder "Multnomah County, 1914," box 4, RG 76A-90, Oregon State Archives, Salem, 5-6; "Reinforced Concrete Bridge over Bridal Veil Creek," Drawing No. 294, in Bridge 823, Maintenance Files, Bridge Section, ODOT, Salem. In more common-place RCDG spans, the deck girders are longitudinal members, with deck beams running transversely between them. Parapet walls offered some crash protection for motorists, but no significant contribution to the bridge's structural design.

[65]Warren, "The Columbia River Highway," 2; Lancaster, "The Columbia River Highway in Multnomah County," 64; [untitled manuscript by K. P. Billner] folder "Multnomah County, 1914," box 4, RG 76A-90, Oregon State Archives, Salem, 4.

[66][untitled manuscript by K. P. Billner] Folder "Multnomah County, 1914," box 4, RG 76A-90, Oregon State Archives, Salem, 4.

Both of these viaducts used another in the family of railing designs seen on the CRH. Wire and metal lath created the framework for a flowing lightweight plaster-concrete guard fence that echoed the masonry arch guard walls, with their arched drainage openings, and the arch form utilized in major bridges along the route. It was used also on the Oneonta Gorge Creek Bridge and the Horsetail Falls Bridge on the CRH. Examples of it also appeared on sections of the Pacific Highway constructed in Jackson County, just north of the California state line.

Multnomah Creek Bridge, HMP 32.1

Lancaster's proposed road alignment closely paralleled the OWRN mainline, giving motorists a full view of the long narrow cascade of water of Multnomah Falls as it bounced off basalt cliffs tucked in the north-facing sheer wall of a deep geologic alcove. The CRH spanned Multnomah Creek on a 67-foot 5-ribbed reinforced-concrete deck arch, with solid spandrel walls and pebble-dashed decorative panels. It was another Billner bridge, and like others which rested on similar soft foundations, he found ways to create a light-weight span.

The five arch ribs of the Multnomah Creek Bridge (HAER No. OR-36-H) substituted for a much heavier barrel arch ring, but Billner conceded to additional structural stability over this often rushing stream with solid spandrel walls rather than delicate spandrel columns. For the artistic touch, and to reduce construction costs, rubble wing walls were substituted for reinforced-concrete structures. They also smoothly transitioned into rubble masonry walls that Lancaster used to stabilize the banks of Multnomah Creek as it passed under the bridge.[67]

Benson Footbridge, HMP 32.1

Throughout the 1890s, a timber footbridge spanned the lower segment of Multnomah Falls. It was a popular tourist attraction with steamship and railroad passengers for many years. Simon Benson, at Lancaster's prompting in 1914, paid for constructing a 45-foot reinforced-concrete deck arch at the same location to provide an opportunity for motoring tourists to view both the upper and lower falls up close. He later purchased the land around Multnomah Falls and other acreage in the Gorge for park land to be managed by the city of Portland. The bridge eventually became part of a 7-mile trail connecting the highway with the top of Multnomah Falls, and beyond to Larch Mountain, a nearby point that afforded a spectacular view of the Columbia River Gorge and the rest of the region's natural landscape (see Figure #10).[68]

Billner designed the Benson Footbridge (HAER No. OR-36-I) as a 45-foot parabolic barrel deck arch anchored into the rock cliffs. Delicate spandrel columns and arched curtain walls supported its narrow deck. The precast railing panels echoed the arch theme and the spindles seen at Latourell and Shepperd's Dell. Billner's greatest task in building this bridge was logistics. The site was difficult to reach with all equipment and materials carried there without the aid of animals or machinery. An ingenious subcontractor employed an aerial trolley to hoist materials

[67]"Reinforced Concrete Bridges on the Columbia Highway in Multnomah County," 189; Bowlby, "The Columbia Highway," 125.

[68]Billner, "Some Bridges on the Columbia Highway," 1147; Smith, et al., *Historic Highway Bridges of Oregon*, 143; Horn, "Oregon's Columbia River Highway," 265; Billner, "Design Features of the Various Types of Reinforced Concrete Bridges Along the Columbia River Highway in Oregon," 122.

to the site and constructed a simple wooden trussed arch to suspend the span's forms instead of using falsework.[69]

Moffett Creek Bridge, HMP 39.8

Just east of Warrendale, five miles east of Horsetail Falls Bridge, the Columbia River Gorge tightens up near a series of rapids or cascades to its narrowest point. There, Moffett Creek runs a course from the basalt cliffs through a sandstone canyon to the river. Billner proposed another unique structure for the CRH's crossing, taking advantage of the uncharacteristically firm foundation material as spring points for an arch. He sought to design a bridge not unlike the one at Shepperd's Dell in that it would make "a strong appearance." By January 1914, he had designed two different spans for this crossing. One was a "flexible" structure and the other was a "hinged type." Lancaster leaned toward constructing the flexible span at that point, but evidence tells us that a three-hinged arch was eventually chosen. Between then and when the bridge design was completed, in early 1915, the OSHC had brought on another bridge engineer, Lewis W. Metzger, and he is credited with the eventual structure's design. It is unknown whether Metzger created his own bridge or if he carried through with Billner's proposal. In any case, a three-hinged Melan arch was constructed at the site rather than a flexible bridge, as Lancaster had preferred.[70]

Metzger began his tenure with the OSHD in September 1914. At Moffett Creek, he is credited with creating one of the longest, shallowest three-hinged arches in the world—one with a clear span of 170 feet and a rise of only 17 feet. Metzger used massive cast-iron hinges at the haunches and at mid span, with large steel pins to carry the load. His design was quite unique for structures not only in the Pacific Northwest but throughout the United States and the rest of the world as well. Interestingly, Metzger consulted with well-known bridge engineer Ralph Modjeski while designing this structure. Modjeski was in Portland for an extended period to design and oversee construction of his Broadway Bridge (HAER No. OR-22), a large rail bascule drawbridge over the Willamette River, in the north end of the Portland's business district. In reviewing Metzger's plans, Modjeski made several recommendations aimed at strengthening the bridge to enable it to safely carry anticipated loads. Metzger made Modjeski's design changes and construction commenced in late spring 1915. It was believed that the Moffett Creek Arch ranked with other similar three-hinged arches in Germany and Spain, and was the longest of this type of span in the United States.[71]

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[69]"Reinforced Concrete Arch Bridge over Lower Multnomah Falls, Office of Oregon Highway Commission, Nov. 14, 1913," Drawing No. 306, in Maintenance Files, Bridge No. 4534, Bridge Section, ODOT, Salem; Ringer, "A 53-Year Secret," TMs [1967], located in "Multnomah Falls Bridge" file, Oregon State Historic Preservation Office, Salem, 1-2.

[70]"Reinforced Concrete Bridges on the Columbia River Highway in Multnomah County," 188; S. C. Lancaster to H. L. Bowlby, 14 January 1914, folder "Multnomah County, 1914," box 4, 76A-90. Oregon State Archives, Salem. Turn-of-the-century Austrian engineer Josef Melan was noted for his use of curved steel "I" beams for reinforcement in shallow arched concrete bridges. The Melan design helped popularize reinforced concrete as a construction medium for bridges.

[71]Ralph Modjeski to H. L. Bowlby, 25 February 1915; Modjeski, by Henry M. Morse, to Bowlby, 13 March 1915; Bowlby to Modjeski, 18 March 1915; and Modjeski, by Morse to [E. I. Cantine], attention C. H. Purcell, 2 April 1915, all in folder "306, Multnomah County, 1915," box 5, 76A-90, Oregon State Archives, Salem. See also Bowlby, "The Columbia Highway," 126. For comparisons with several contemporary three-hinged "masonry" bridges, see: [Henry L. Bowlby] to S. C. Lancaster, 20 January 1915, folder "Multnomah County, 1914," box 4, 76A-90, Oregon State Archives, where Bowlby listed several "which have a similar, or less, rise in proportion

Toothrock and Eagle Creek Viaducts, HMP 42.2

East of Moffett Creek, the CRH encountered several geological obstacles in far eastern Multnomah County that required the road to be founded as much on structures as on cuts. The Columbia River Gorge's site of the mythical "Bridge of the Gods," which spanned the narrowest passage through the Cascade mountain range at a point between Tanner Creek and Eagle Creek, had been a barrier even to the military men who attempted to construct a portage road there in the 1850s. These circumstances caused them to head far to the south, avoiding this location all together with a steep, narrow trail over the cliff tops. The OWRN eventually tunneled underneath "Tooth Rock," and the sheer cliffs behind it at river level. Lancaster, though, took the middle road by locating the CRH's alignment up and around the cliff face. The easiest, but by far the most expensive alternative was to cut down the rock slope to form a wide ledge to carry the highway around the promontory. It would have involved time-consuming and costly drilling and blasting an unstable basalt formation some 200 feet above the Columbia and the OWRN mainline and would have left ugly scars on the landscape. Another might have been a tunnel, as was used at Oneonta Gorge or later at Mitchell Point. The compromise was a pair of viaducts hanging on the cliff face.[72]

It appears that only railing treatment differentiates the Toothrock and Eagle Creek viaducts (HAER No. OR-36-N). In reality, the Toothrock Viaduct is like other spans of this type found on the CRH, but the Eagle Creek structure is a half-viaduct, and is only 12 feet wide. Metzger established the remainder of the roadbed on ledge.

A mission of creating a variety of unique structures along the CRH, but tying them together with a family of railing designs is evident in these two structures. The Toothrock Viaduct used the delicate spindle-and-cap railing panel similar to those seen on the Shepperd's Dell and Moffett Creek bridges. It contrasted well with Tooth Rock's rugged surroundings. Conversely, the Eagle Creek Viaduct's rubble masonry railing with arched drainage openings and concrete cap, complemented the landscape and continued, without interruption, the adjacent masonry guardrails and retaining walls. Lancaster likely believed that the mid-point between these two structures was an ideal location for travelers to pause, to take in the views, and imagine what the "Bridge of the Gods" might have looked like eons ago, and created a pedestrian overlook,

to length" as the Moffett Creek Bridge, at 170', with a 17' rise. These included the Prince Regent Bridge (n.d.), Munich, Bavaria, 213', 21' rise; Mulden Bridge (n.d.), Gochren, Saxony, 200', 22.5' rise; Maximilian Joseph Bridge (n.d.), Munich, 200', 20' rise; Neckar Bridge (1903), Neckarhausen, Germany, 165', 13.5' rise; Donau Bridge (1893), Munderkingen, Wurtemberg, 164', 16.4' rise; Nalon Bridge (n.d.), Segados, Spain, 165', 18.7' rise; and the Inzlgkofen Bridge (1896), Wurtemberg, 141', 14.4' rise, 1896. Bowlby also provided bibliographic references for each citation.

[72]Bowlby, "The Columbia Highway," 126; American Indians believed that the promontory was the southern abutment of the mythical Bridge of the Gods, part of the great divide of the Cascade Range spanning the present path of the Columbia River. Modern geologists see it as a cliff immediately downstream and across the river from remnants of the Cascade landslides of about 1260 C.E., which deposited a ½ cubic mile of material from the river's northern shore into the river channel and diverted its flow a mile to the south. This event eventually dammed the river and created a natural barrier, maybe the Bridge of the Gods. Eventually the lake behind the slide broke through, creating the rapids later known as the Cascades of the Columbia. For early Oregon Pioneers, the outcropping behind Tooth Rock was a barrier to overland travel to Portland as much as the Cascades were a barrier to river traffic. See John Eliot Allen, *The Magnificent Gateway: A Layman's Guide to the Geology of the Columbia River Gorge* (Forest Grove, OR: Timber Press, 1979), 52-56, 98.

Eagle's Nest. Abandoned in 1937, these viaducts were restored and opened for non-motorized traffic in 1996 as part of the Historic Columbia River Highway (HCRH) State Trail.

Eagle Creek Bridge, HMP 42.7

The last structure built on the Multnomah County portion of the CRH was the Eagle Creek Bridge (HAER No. OR-36-P), a 60-foot three-rib reinforced-concrete deck arch. The design, like those seen on other CRH bridges, is unique, but in addition, it was the only one completely faced in native stone. Even though the Eagle Creek Bridge is the smallest of the eight arch spans eventually constructed on the CRH between Portland and The Dalles, its design, both from engineering and artistic standpoints, set it apart from the others. The use of three ribs rather than two, and the cage-like arrangement of plain, square columns and struts supporting the road deck gave the structure a clean, modern appearance. Yet, in keeping with the philosophy employed on the CRH's construction, the bridge was "dressed up" to complement the natural landscape while overtly stating its presence as a man-made object. The span was veneered in the same basalt rubble masonry seen in guard walls and retaining walls throughout the CRH. It is unknown who designed the bridge, but likely Metzger. A part of the structure is a long, narrow masonry alcove constructed at the bridge's northwest corner. Evidently, Lancaster saw the opportunity to create a pedestrian overlook for observing the many fish seen in Eagle Creek, including fall runs of migratory salmon.[73]

Masonry Structure on the Columbia River Highway

The family of masonry structures seen on the CRH set a standard for the use of artificial rock work on rural roads and was popularized in highway engineering texts and periodicals during the 1920s (see Figures #8 & #9). Their application predates by over a decade any National Park Service efforts under the leadership of Daniel Ray Hull, Thomas C. Vint, and Ernest Davidson, to develop Service-wide masonry standards.[74]

Construction crews reportedly included many Italians who were known for their masons' skills. They were adept at creating the kinds of structures which enchanted Hill and Lancaster on their travels to Europe in 1908, especially the masonry construction that they saw on the roads along the Rhine in Germany and the *Axenstrasse* along Lake Lucerne in Switzerland.[75]

Basalt rubble masonry forms a key element of the CRH, and is found in dry-laid retaining walls, mortared guard walls, and guard rocks (coping stones). Lancaster likely took a cue from Andrew

[73]Rosenthal, "Structural Features of a Great Scenic Highway,"8. See HAER drawing 23 of 27, Eagle Creek Bridge, HAER No. 36-P, Historic Columbia River Highway Recording Project, 1995, Pete Brooks, delineator. Brooks interpreted original elevation and section drawings found in Bridge No. 2063A, Microfiched Correspondence Files, Bridge Section, ODOT, Salem.

[74]Linda Flint McClelland *Presenting Nature: The Historic Landscape Design of the National Park Service, 1916 to 1942*, Department of the Interior, National Park Service, (Washington: Government Printing Office, 1993), 126-29.

[75]Warren, "The Columbia River Highway," 2. It is unknown if the masons came directly from Italy for this job. Roy Klein once said that they came from no further than the Italian neighborhoods of Portland. In any event, the Italian masons who worked on the HCRH were skilled craftsmen. Several of them went on to complete masonry on Timberline Lodge, a Works Progress Administration ski facility constructed on Mount Hood as part of Franklin D. Roosevelt's New Deal. See Fahl, "S. C. Lancaster," note 92, p. 142.

Jackson Downing by using rock structures to unite and harmonize the manmade elements with the natural setting. This was especially evident in the moist, damp setting of the CRH from Troutdale to Hood River, where the mosses and lichens found new homes on these highway structures.[76]

Retaining walls used around Crown Point and throughout the CRH kept together the roadbed, preventing it from falling away from the cliff faces. They consisted of a footing placed at the toe of slope, and then built up using local basalt rubble. The masons preferred to create tight, dry masonry walls over mortared walls because they allowed water to drain away from the road bed and prevented the walls from blowing out under hydraulic pressure. At the road level, masons finished off the walls either with concrete curbing, or in locations that presented dangerous drop offs, "guard rocks" or coping stones. These boulder-sized pieces of basalt were shaped to appear like teeth. The guard rocks were both aesthetically pleasing and functional.[77]

The masons also built masonry guard walls, or rubble parapet walls. Lancaster used this form as a way of protecting motorists and pedestrians from crashing or falling over the roadway's edge. These walls were seen on straight sections of the CRH, but were most predominant on curves. They have an uncanny resemblance to the walls along the *Axenstrasse*, and consist of slip-form grout-lock basalt-rubble walls with picturesque arched openings and concrete caps (see Figure #9 for construction details).[78]

Guard walls on the CRH were typically 30 inches tall and consisted of random rubble, with semi-elliptical or semi-circular arched openings and finished with concrete caps. The arched openings were included as much for aesthetics as for function. They improved drainage from the road surfaces—to help prevent pooling—and preserved the walls' integrity. Guard walls appear on NPS roads in the early 1920s, and take on standardized designs only in 1928 as part of the NPS-BPR agreement. The CRH masonry guard wall, however, saw widespread use in Multnomah County and neighboring Clackamas County throughout the 1920s and up to the mid-1930s, when WPA projects popularized use of the BPR's crenellated masonry wall designs.[79]

Pavement on the Columbia River Highway

In April 1915, the Multnomah County electorate decided to pave its CRH sections with Warrenite, a patented bituminous mixture developed by the Warren Construction Company. Despite the measure's strong resistance at the polls, voters approved the $1.25 million needed to complete the project to improve the CRH's drivability and long-term durability. The pavement, consisting of a two-inch layer of course-graded tar and aggregate mixture (dense asphaltic concrete), was laid while hot on a crushed rock base, over the macadam roadway originally constructed on the CRH in Multnomah County. It was given a "flush coat" of asphalt to seal it.

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[76]See McClelland, *Presenting Nature: The Historic Landscape Design of the National Park Service, 1916-1942*, 15.

[77]Interview, Elaine G. Pierce and Robert W. Hadlow with Richard Fix, Master Mason, ODOT, Summer 1995; guard rocks, or coping stones, appeared also on the carriage roads of Acadia National Park, in Maine, at about the same time as on the HCRH. There, they were known as "Mr. Rockefeller's teeth," for John D. Rockefeller, Jr., who financed that large road network, see Ann Rockefeller Roberts, *Mr. Rockefeller's Roads: The Untold Story of Acadia's Carriage Roads and Their Creator* (Camden, ME: Down East Books, 1990).

[78]Interviews, Pierce and Hadlow with Fix, Summer 1995.

[79]Ibid.

The Warrenite was judged superior to the standard "Topeka" mix beginning to see popularity elsewhere in the country. It was completed as far as the Multnomah County line by the end of the summer.[80]

Meanwhile, crews pushed ahead on the segments in Hood River and Wasco counties as money became available. Even though the Columbia River Gorge in Multnomah County had seemed almost insurmountable, the obstacles awaiting locating engineers and structural designers to the east were equally challenging propositions.

Dedication of the Columbia River Highway

In June 1916, Portland society turned out for two dedication celebrations for the CRH. Multnomah Falls was the scene of an elaborate and idealized pageant commemorating the Columbia Gorge's history and lore. Also that day, Samuel Lancaster and the highway's many promoters spoke to a crowd gathered at Crown Point. Rose petals were scattered and loganberry juice (Oregon's temperance beverage) was enjoyed by all. At five o'clock in the afternoon, U.S. President Woodrow Wilson touched an electric button in the White House, which sent a telegraphic impulse across the nation and unfurled the American flag at Crown Point.[81]

[80]C. Lester Horn, "Oregon's Columbia River Highway," *Oregon Historical Quarterly* 66, no. 3 (September 1965): 261, 270; Ronald J. Fahl, "S. C. Lancaster and the Columbia River Highway: Engineer as Conservationist," *Oregon Historical Quarterly* 74, no. 2 (June 1973): 123; "Bituminous Macadam," in *First Annual Report of the Oregon State Highway Engineer for the Period Ending November 30, 1914* (Salem: State Printing Department, 1914), 13-14.

[81]Fahl, "S. C. Lancaster," 123.

Vista House

Lancaster envisioned some sort of building constructed in the middle of the Crown Point Viaduct both to provide aid to the weary or stranded motorist, and as a monument to Oregon pioneers. With the backing of many prominent Portlanders and the blessings and financial support of the Multnomah County Commissioners, plans were assembled in 1916 for "Vista House," a public comfort station and observatory building constructed on the piece of ground encircled by the viaduct.

Prominent Portland architect Edgar M. Lazarus designed a domed octagonal structure with basement rest rooms and caretaker's quarters, a main floor gallery, and a second-story outdoor observation balcony. The building was constructed in the Jugenstil architecture style, based on the German new art movement, with reinforced concrete and sandstone block veneer, and stained-glass windows. The interior was predominantly Alaskan marble. Vista House was completed in 1918 at a cost of nearly $100,000, well over its original $12,000 budget. Vista House is significant for its long-term association with the CRH. It is also symbolic of the importance that Oregon's Progressive Era motoring pioneers placed on safety, sanitation, and organized recreation. It is one of the two buildings in the Columbia River Gorge most closely associated with the highway.[82]

The Columbia River Highway in Hood River County and Wasco County, Oregon

From 1913 to 1915, the Hood River and Wasco county courts arranged for John Arthur Elliott, an OSHD locating engineer, and his crews to prepare a plan and profile for the CRH through their counties. Many voters in both jurisdictions were reluctant to spend the money on constructing the route, let alone employ a locating engineer to survey it. Some were completely satisfied with the present county road system, which included grades of up to 18 percent on routes between Hood River and The Dalles.[83]

John Arthur Elliott and Hood River County

Elliott began his survey of Hood River County in late 1913. By early February 1914, OSHD crews had located much of the twenty-two miles of the new highway from the Multnomah County line to the city of Hood River. They mostly filled in gaps of the military road that construction of the ORN mainline in the early 1880s had destroyed. Hood River and Wasco counties eventually realigned portions of the military route to avoid its steep grades and tight curves. Meanwhile, rugged terrain between Hood River and Mosier, and indecision among

[82]Lewis A. McArthur, *Oregon Geographic Names*, 6th ed., revised by Lewis L. McArthur (Portland: Oregon Historical Society Press, 1992), 226-27; Dana," New Hotel Will Make Crown Point the Mecca for Travelers," p. 5; Howard O. Rogers, "A Day on the Columbia River Highway," *Sunset, the Pacific Monthly*, n.d. [c.1916]; Nina Rappaport, et al., "Vista House Historic Structure Report," Columbia River Highway Project, Cascade Locks, OR, 1981, 3-8 and 45-46; "Columbia River Highway—Vista House Specifications and Plans," [Undated Manuscript by Edgar M. Lazarus, edited by John B. Yeon] 2/47, Mss 2607, Oregon Historical Society, Portland.

[83]*Second Annual Report of the Engineer of the Oregon State Highway Commission for the Year Ending November 30, 1915* (Salem, 1916), 26-30. See J. A. Elliott [locating engineer] to John H. Lewis, State Engineer, 3 June 1916, and other letters in folder "552, Wasco County, J. A. Elliott, 1916," box 11, RG 76A-90, Oregon State Archives, Salem.

Wasco County residents about the best route to follow between Mosier and The Dalles, delayed agreement on the location for that section of the CRH.[84]

The OSHD hired Elliott to oversee the road survey through Hood River County because of his reputation as a competent locating engineer with the Washington State Highway Commission. He had earned a Bachelor of Science degree in Civil Engineering from the University of Washington in 1909 under Lancaster. Even before graduating, Elliott began work with the WSHC, Bowlby, and Hill. Elliott left the state for brief employment with the U.S. Department of the Interior's Bureau of Reclamation before signing on with the OSHD in 1913. He brought with him the skills of a top engineer, combined with the belief in locating a route that took in the many scenic wonders along the Columbia River in Hood River County. His work complemented greatly his mentor's engineering abilities and eye for aesthetic qualities seen in the CRH's construction in Multnomah County.[85]

By July 1914, Hood River County citizens voted nearly three-to-one for a $75,000 bond issue to begin constructing connector segments of the CRH between the Multnomah County line and the city of Hood River. What may have prompted the issue's overwhelming popularity was businessman and highway promoter Simon Benson's guarantee that if the citizens would approve the $75,000 bond, which was the cost estimated by the OSHD to construct this section of road, he would pay for any overruns. To reinforce his commitment, Benson purchased the entire bond issue within a month, and before Labor Day, Hood River County awarded contracts to the Newport Land and Construction Company to complete sections of the CRH west of the city of Hood River. Though the segments funded through the $75,000 bond met the standards set for the highway in Multnomah County, the existing portions of the old military road continued to provide little more than two wheel ruts for travel. The hope, though, was that this construction marked the beginning of a full-scale improvement of the entire route.[86]

Mitchell Point Tunnel and Viaduct

Elliott's greatest challenge in Hood River County was Mitchell Point, a large basalt headland about four miles west of the city of Hood River. There, the old military road passed a saddle between the 400-foot Little Mitchell Point and the 1,100-foot Big Mitchell Point at an elevation of 250 feet. The route included grades between 10 and 23 percent to bring it up and over the natural passage in the formation. Elliott feared that to carry the CRH over the same saddle he needed to "develop distance" as Lancaster had done in Multnomah County, to keep the grade at something less than 5 percent. One outing of highway enthusiasts illustrated the difficulties in driving over Mitchell Point on the existing wagon road,

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[84]"Hood River County, Columbia Highway," in *First Annual Report of the Oregon State Highway Commission*, 152-53.

[85]Elliott's departure from Washington State may coincide with Bowlby's forced resignation as state highway engineer in 1911. "Memoir Abstract—John Arthur Elliott, M. ASCE," in *Transactions, American Society of Civil Engineers* 125 (1960): n.p.

[86]Hood River County only approved its bond issue to cover construction if Simon Benson would guarantee to make up the difference if costs overran the bond. Indeed, Benson paid at least $13,000 out of his own pocket for expenses in Hood River County. See *Second Annual Report of the Engineer of the Oregon State Highway Commission*, 26-30.

> Some machines refused to climb the hill because the oil [gasoline] would settle back in the tank beyond reach of the motors, others had brakes the driver would not trust, but a great many machines were turned back when the man at the wheel took a look at the narrow, winding and rocky path with a wall of rock and gravel on one side and a death dealing abyss on the other.

Elliott chose instead to take a shorter, more direct alignment, but it required finding a location "which would not endanger the railroad and at the same time would not cost excessively." He eventually located his route by cutting a ledge into a cliff, building a viaduct, and tunneling through Lower Mitchell Point. Elliott saw his plan for a cliff-hugging road, viaduct, and tunnel as the practical solution for ending hair-raising and dangerous traveling in this part of the Columbia River Gorge.[87]

Elliott had learned of the three-windowed tunnel on Switzerland's *Axenstrasse* while studying with Lancaster at the University of Washington. In surveying the CRH in the Mitchell Point section, he picked the Lower Mitchell Point for a similar design. He hoped to improve upon the *Axenstrasse* tunnel, which had pillars between windows built up from masonry, by creating a tunnel on the highway that had no artificial construction. The natural columns, though, could not be too thick, for Elliott feared the windows might take on the appearance of side tunnels. He also chose a curved alignment rather than a straight bore, because he believed "the light effect would be lost." The adits would admit a continuous glow during daylight hours, for which the motorists would not know the source. It was also the most economical construction alternative. The natural portals and window, along with the unlined bore, visually connected the tunnel with its surrounding landscape, by taking on the appearance of a cave—nature's handiwork—and continue to help make this portion of the CRH visually subordinate to its surroundings.[88]

In his reconnaissance of the tunnel site, Elliott noted indentations in the cliff wall that he believed were "cheap window locations," and with some testing, he pinpointed the five that he thought would best illuminate the bore. In addition, the bore's curvature was such that drivers approaching the tunnel from either end had a head-on view of the central three windows and the rock columns that separated them. To insure that the firm awarded the excavation contract used care in boring the tunnel and in cutting the adits, the highway department contract provided a premium for "close work." It allowed a variation of 5 percent from the section that Elliott specified without any price adjustment, while overbreak in excess of 10 percent was not tolerated. So while the tunnel was designed with project costs as the first concern, aesthetics and an incentive for accuracy in cutting followed closely behind.[89]

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[87]Elliott, "The Location and Construction of the Mitchell Point Section of the Columbia River Highway, Oregon," 3-4; Elliott, "Mitchell Point is Bar to Many Cars on Hood River Trip," *Portland Oregon Journal*, 12 July 1915, 3; "Report on Columbia Highway, Hood River County, 1914," pp. 1-2; Samuel Christopher Lancaster, *The Columbia: America's Great Highway* (author, 1916), 105-06.

[88]Elliott, "The Location and Construction of the Mitchell Point Section of the Columbia River Highway," 16-17. See McClelland, *Presenting Nature: The Historic Landscape Design of the National Park Service, 1916-1942*, 131-32.

[89]Elliott, "Report on Mitchell's Point Section of the Columbia River Highway," 2-3; Elliott, "The Location and Construction of the Mitchell Point Section of the Columbia River Highway," 16-17; "Mitchell Point Tunnel a Rare Engineering Feat," *Portland Oregonian*, 29 August 1915, sec. 2, p. 9.

Construction began on the CRH's Mitchell Point section in March 1915. At the western end, the highway's alignment left the wagon road's route, and there the first obstacle was to round a cliff that was too high and too expensive to take out as an open cut. Elliott found that he could hold a line out as far as possible, undercutting the narrowest possible ledge from the cliff for the roadbed (essentially a half-tunnel) and constructing masonry retaining walls to gain width. From there he built a 192-foot reinforced-concrete slab viaduct over a shell rock talus slope, before cutting a 390-foot windowed tunnel through Lower Mitchell Point. From the east portal, the route continued on to rejoin the wagon road's alignment. The total distance of the Mitchell Point section was .84 miles.[90]

Elliott defended the tunnel's construction from detractors who declared it impracticable, expensive, and dangerous. Many contractors even declared the tunnel's construction impossible, but the Mitchell Point Tunnel and Viaduct opened for traffic in early September 1915. Total costs were about $47,000, which was $3,000 less than the state appropriation.[91]

Mitchell Point Tunnel became known as the "Tunnel of Many Vistas," and Samuel Lancaster believed that it was "among the most wonderful pieces of highway construction in the civilized world." He saw it as "fully equal to the famous 'Auxenstrasse' [*sic*] of Switzerland and one of the great features of the Highway." Indeed, while the *Axenstrasse*'s tunnel had three windows, the Mitchell Point Tunnel had five. This tunnel's style was used again on the CRH on the Mosier Twin Tunnels. The portals and windows at both locations were "cave-like" elements that simulated nature's handiwork. They were later seen in the 1920s on early national park roads. The Zion-Mount Carmel Tunnel, created in Zion National Park in 1930, continued the theme of viewing bays, or adits, for visitors to take in the surrounding natural beauty.[92]

The Mitchell Point Tunnel was closed in 1953 when a new water-level highway replaced what many considered a narrow, hazardous piece of the CRH. In 1966, the tunnel and viaduct were removed with explosives and machinery during widening of the water-level route to a four-lane freeway configuration. A resource important to Oregon and American transportation history was lost forever.

Hood River Bridge, HMP 67

The CRH followed surface streets through the city of Hood River, becoming a major route through its tidy brick business district. At the east end of the city, the route crossed the Hood River. An old timber truss span there used as part of the local road network, had outlived its usefulness. Metzger created a new three-span reinforced-concrete parabolic ribbed deck arch structure for the site. Parker and Banfield, of Portland, completed the 420-foot bridge in 1918 at a cost of nearly $50,000. It was the highway's single most expensive span. The Hood River

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[90]"Detailed Reports of Counties," *Second Annual Report of the Engineer of the Oregon State Highway Commission*, 27, 29, 81; Elliott, "The Location and Construction of the Mitchell Point Section of the Columbia River Highway," 3, 15-16, 19.

[91]Elliott, "The Location and Construction of the Mitchell Point Section of the Columbia River Highway," 18-19.

[92]Lancaster, *The Columbia: America's Great Highway*, 118. See Linda Flint McClelland's discussion of NPS tunnels in *Presenting Nature: The Historic Landscape Design of the National Park Service, 1916-1942*, 131-34.

Bridge was dismantled in 1982 and replaced by a modern structure. Its destruction sparked a groundswell of support for saving and restoring extant portions of the CRH.[93]

Hood River to Mosier Section

The CRH's Hood River to Mosier section presented some of the most difficult engineering problems on the entire route. Elliott faced two obvious choices in locating the highway in this arid landscape. There was no practical way to build the CRH east of Hood River by following the river. The OWRN had taken the only available land for its roadbed decades before. Instead, Elliott was forced to locate the highway in some of the most rugged terrain found in the Gorge. His first alternative followed the OWRN mainline's general course with some variation in elevation to meet certain passes. The route was just 5.8 miles long and rose only to an elevation of 160 feet, and used portions of an abandoned railroad grade. He estimated the construction as quite costly because of the heavy grading necessary to carry the road around many basalt cliffs. The second alignment left Hood River and went over the Mosier Hills separating the two towns. Elliott's estimation of constructing a hill route noted equally expensive problems. The existing county road east of Hood River ran on grades of up to 12 percent out of the city to an elevation of nearly 1,600 feet at the summit, before dropping down into Mosier at grades nearing 18 percent. While he could use loops to maintain a grade not exceeding 5 percent out of Hood River, he found it difficult to bring the road back down to Mosier because the hillsides sloped toward the river and ended in a high bluff.[94]

Both routes, though, had their advantages, the distance between Hood River and Mosier by rail was just over six miles and the river route for the CRH was only slightly longer. But, the proposed summit route, even at 13 miles, had its advantages. Elliott believed that in line with the practice of advertising the CRH as a "scenic highway through the Columbia River gorge," its design should, in part cater to the wishes of tourists. "The aim of a scenic highway . . . is to show the country," wrote Elliott. He added, "Not a traveler goes through Hood River without wondering where Mount Hood is and the famous Hood River orchards are." Furthermore, "To put a scenic highway down in the river where none of this can be seen would be passing a section made up of views which would leave a lasting impression on the traveler."[95]

By late 1916, Elliott left his position with the OSHD to work as the highway engineer for Wasco County. Meanwhile, there was continued skepticism among Wasco County voters about the necessity for any realignment at all. Some recommended merely adding "heavy" fences to the existing steep county road to "assist poor drivers in negotiating the hill." Others supported the river route because it presented the most economical construction. By October 1917, the OSHD

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[93]"NAER Inventory Form—Hood River Bridge, Bridge No. 200," U.S. Department of the Interior, Heritage Conservation and Recreation Service, completed by Dwight A. Smith, Oregon Department of Transportation, 1980.

[94]*Third Biennial Report of the State Highway Commission Covering the Period December 1st, 1916 to November 30th, 1918* (Salem, 1919), 111-12; J. A. Elliott to John H. Lewis, State Engineer, 28 March 1916, folder "Report File #21, Survey in Hood River County, 1916," box 9, RG 76A-90, Oregon State Archive, Salem; Elliott to Bowlby, 31 March 1914, folder "Hood River County, J. A. Elliott—Resident Engineer, 1914, box 1, RG 76A-90, Oregon State Archives, Salem.

[95]Elliott to Lewis, 28 March 1916, folder "Report File #21, Survey in Hood River County, 1916," box 9, RG 76A-90, Oregon State Archive, Salem.

had prepared yet another route plan, this time under the direction of Roy A. Klein, the CRH's new locating engineer.[96]

Klein used Lancaster's method of developing distance to create a series of loops that maintained a grade of less than 5 percent and curves with turning radii no less than 200 feet to take the road out of the Hood River Valley. His technique was similar to Lancaster's with the Figure-Eight Loops near Crown Point, in Multnomah County, and was the second of three sets of loops used on the CRH. He eventually founded an alignment that followed the river for most of the distance. It was farther away from the OWRN main line than Elliott's first alternative, to avoid closing the tracks because of rock blasting operations. It reached a summit of 522 feet and the distance between Hood River and Mosier was reduced to just over six miles. The most difficult part of this route, though, was locating along the leading edge of a basalt bench (a portion of the Bingen Anticline) and running it east to a gravel plateau. A pair of tunnels, bored through this unstable basalt formation, became the most efficient, economical solution and was least intrusive on the natural landscape.[97]

Mosier Twin Tunnels

In 1920, the firm of A. D. Kern of Portland had graded much of the CRH west of Hood River and received the contract to build the Hood River to Mosier section laid out by Klein. This included what became the Mosier Twin Tunnels. It was heavy work that required the use of horse and wagons and several steam shovels. The tunnels, located just inside Wasco County, consisted of an 81-foot bore, followed by 24 feet of open space, and then another bore of 288 feet. Like the Mitchell Point Tunnel, their design included windows. Two of them were cut in the eastern, or longer tunnel. A feature not seen, though, on the Mitchell Point Tunnel was a cliff walk constructed from the area between the tunnels and along a ledge to the western adit of the east tunnel. It consisted of a walkway, concrete steps, and a masonry guardrail. The cliffwalk provided motorists a chance to peer out over the cliff's edge for a breathtaking glimpse of the Columbia River. Kern had completed its contract by July at a cost of $220,000, financed through voter-approved road construction bonds and Oregon's new motor vehicle fuel tax—the first "gasoline tax" in the nation. These tunnels showed great sensitivity to the landscape in their design and construction.[98]

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[96]"Description of Work of the State Highway Department in the Counties of the State, 1917-1919," *Third Biennial Report of the State Highway Commission*, 111-12; Elliott to Lewis, 28 March 1916, folder "Report File #21, Survey in Hood River County, 1916," box 9, RG 76A-90, Oregon State Archive, Salem; "Mosier Grade To Have Fence; Will Be Widened in Places," *The Dalles Chronicle*, 23 August 1916, clipping in folder "553, Wasco County Court, et al., 1916," box 11, RG 76A-90, Oregon State Archives, Salem; John H. Lewis to The Honorable County Court, Wasco County, 24 November 1916, folder "553, Wasco County Court, et al., 1916," box 11, RG 76A-90, Oregon State Archives, Salem; Herbert Nunn, State Highway Engineer, to R[oy]. A. Klein, 6 September 1917. Klein served as State Highway Engineer from 1923 to 1932 and set "Oregon's highway program on the course that made it a model for the nation." He then had a long career with the Bureau of Public Roads. See "Roy Alton Klein," *Oregonian*, 4 June 1971, p. 36.

[97]Herbert Nunn, State Highway Engineer, to R[oy]. A. Klein, 6 September 1917; "Road Board Adopts Hood River—Mosier Survey, Bids Asked, *Portland Oregon Journal*, 9 October 1917, p. 16; "The Mineral Resources of Oregon," (Oregon Bureau of Mines and Geology, 1916), 117; *Fourth Biennial Report of the Oregon State Highway Commission Covering the Period December 1st, 1918, to November 30th, 1920* (Salem [1920]), 128.

[98]Kern brought in men, horses, and wagons, along with a Bucyrus 18B steam shovel, a Marion Standard-Gauge 60 shovel, 30 four-yard ore cars and several Ingersoll-Rand air drills. See "Description of the State Highway Department in the Counties of the State, 1919-1920," *Fourth Biennial Report of the Oregon State Highway*

Meanwhile, boring the Mosier Twin Tunnels was a monumental task for A. D. Kern, with overbreak a continual worry. Even before the contract was completed, OSHD engineers noted that continuous rockfall in and near the shorter, or west tunnel, had become a "a serious menace to travel in its present condition." As with the Mitchell Point Tunnel, the natural portals and unlined bores of the Mosier Twin Tunnels harmonize with the surrounding landscape. By late fall 1920, however, rockfall was so regular that the OSHD Bridge Department stabilized the bores with timber sets and cedar lagging. Crews also constructed masonry portals for both tunnels to protect the ends of each bore and create what were described as "pleasing entrances" for motorists.[99]

By the early 1930s, the OSHD widened the linings and portals to accommodate larger vehicles and by the 1940s installed one-way traffic signals. The tunnels were closed in the early 1950s amid concerns over rockfall, with traffic diverted to the nearly completed water-level highway. They were reopened for non-motorized use as part of the HCRH State Trail in 1997.

Standard Guard Fence

Long courses of wooden post and two-rail guard fence, painted white, were erected along the CRH at locations throughout the highway to prevent errant vehicles from running into the adjacent railway mainline. The Standard Guard Fence is symbolic of the CRH's early dual functions—a scenic highway and a major commercial trunk route. Its stark white color, adopted as a safety measure, is in sharp contrast to the visually subordinate masonry structures found along the road. By 1920, the US Bureau of Public Roads had adopted the Standard Guard Fence for its western Federal-Aid roads. The NPS, in conjunction with the BPR, developed a family of standard guard fences for use on national park roads in 1928.[100]

Funding Changes and Personnel Changes in the OSHD

Commission, 388; "Description of the Work of the State Highway Department in the Counties of the State, 1921-1922," *Fifth Biennial Report of the Oregon State Highway Commission Covering the Period December 1, 1920 to November 30, 1922* [Salem, 1922], 519; "An Act to Provide a License Tax on Gasoline . . . ," Chapter 159, *General Laws of Oregon, 1919*. See John Chynoweth Burnham, "The Gasoline Tax and the Automobile Revolution," *Mississippi Valley Historical Review* 48 (December 1961): 435-59, especially 437-40.

[99]See Bridge Drawing No. 1416, Bridge No, 653, Drawing Files, Bridge Section, ODOT, Salem. In its *Fourth Biennial Report*, pp. 388-89, the OSHD reported that it had advertised for bids for placing a concrete lining in the west tunnel and building a "monumental portal." A timber lining was chosen over a concrete lining because it could trap the continual rock fall behind the cedar lagging and prevent it from reaching the road. In addition, the Bridge Department also looked into incorporating a castle- or fortress-like tower as part of the new masonry west portal. The tower was never built, and the portal construction was delayed. The Bridge Department actually designed an ambitious masonry and reinforced-concrete rock catch roof structure for the cliff walk. The obvious purpose of the rock catchment was to protect pedestrians from showers of rock breaking away from the unstable formations on the hill above. Nevertheless, the structure was not built, probably because of its projected high costs and aesthetic concerns. Instead, the cliff walk was closed. See Bridge Drawings Nos. 1415 and 1639, Bridge No. 653, Drawing Files, Bridge Section, ODOT, Salem; several pieces of intradepartmental correspondence address the rockfall issues in the Mosier Twin Tunnels. Copies are located in the Thommen Report, Bridge Section, ODOT.

[100]See "Substantial and Attractive Guard Rail on Oregon Road," *Public Roads* 2, no. 23 (March 1920): 9-10; McClelland, *Presenting Nature: The Historic Landscape Design of the National Park Service, 1916-1942*, 127-29; *Fifth Biennial Report of the Oregon State Highway Commission*, 510.

The old state highway commission organization, with the governor, secretary of state, and state treasurer, gave way in 1916 to a governor-appointed citizen's commission. In addition, the Federal-Aid Road acts of 1916 and 1921 directed states in a comprehensive nationwide highway building program through the U.S. Bureau of Public Roads and eventually brought the federal government in as a full partner in highway improvement projects throughout the nation. Though the CRH's construction in Hood River and Wasco counties paralleled previous effort on the route in Multnomah County, neither jurisdiction had the large population base and accompanying revenues to wholly fund work on the scale seen on the CRH. Only with federal funding was the highway completed in 1922.

In March 1919, with increased public support for highway improvement measures, the OSHD quickened the pace of its road and bridge building activities. More Oregon construction dollars, combined with federal-aid funds given states on a "use it, or lose it" basis, warranted the highway department's speedy action in intensifying road and bridge building. The state had relieved from the counties the construction of major highways by addressing them collectively as a statewide trunk route system. Amid agency reorganization and funding realignments came personnel changes. Henry Bowlby had left the department for the BPR in 1915. Herbert Nunn, a young energetic highway engineer, eventually replaced him in 1917. Likewise, Charles Purcell, who oversaw Billner and Metzger in designing and building the many bridges in Multnomah County and Hood River County, went on to other pursuits, eventually designing the San Francisco-Oakland Bay Bridge. Oregon needed a qualified engineer to oversee all aspects of bridge design and construction for state highways and for many county roads. In 1919 the highway department hired Conde B. McCullough, a highly competent structural designer as state bridge engineer.

Mosier Creek Bridge, HMP 73.2

Progressing eastward in Wasco County, the CRH entered a much more arid country, away from the Gorge and part of a wide open, dry expansive landscape of scrub oak, bunch grass, poison oak, and rattlesnakes. Within a few short miles, it wound down the basaltic hillside from the Mosier Twin Tunnels to the village of Mosier, located at river level. There it offered the first of several opportunities for Conde B. McCullough to show his talents as a master designer of reinforced-concrete arch bridges, designing a span over Mosier Creek.

The OSHD was left without a chief bridge engineer in 1916, when Purcell resigned to pursue other interests. In 1919, after the department's reorganization and the infusion of federal aid for highway improvement, McCullough was hired as the state bridge engineer. He came to Oregon with a long list of accomplishments in the field of highway bridge design. After graduating from the Iowa State College in civil engineering in 1911, he created a modern bridge design program for the Iowa Highway Commission, under the guidance of his close friend and colleague, State Highway Engineer Thomas H. MacDonald.[101]

In 1916, he began a short career at the Oregon Agricultural College (later Oregon State University), serving as chair of the structural engineering program. In 1919, with solid

[101]MacDonald left Iowa to serve as Chief of the federal Bureau of Public Roads, the predecessor of the Federal Highway Administration, from 1919 to 1953.

experience in bridge designing and a C.E. degree from Iowa State, McCullough moved to Salem. He and his staff designed hundreds of bridges throughout the state from 1919 to 1936, including many large reinforced-concrete arch spans. Some of McCullough's early work in Oregon is seen on the CRH in Wasco County. In this post, he brought himself and Oregon national and international prominence in highway bridge engineering.[102]

The Mosier Creek Bridge, completed in 1920, includes a 110-foot reinforced-concrete ribbed deck arch with concrete slab approaches. Its open spandrel design and parabolic arch form were very similar to a bridge McCullough had only just recently completed over the Rogue River, at Rock Point, on the Pacific Highway. The Mosier Creek Arch exhibited all the signature characteristics of McCullough's early arch spans: spandrel columns with semi-circular arched curtain walls, pebble-dashed panels on tapered piers, elbow brackets supporting cantilevered sidewalks, and precast railing panels consisting of segmental arch openings. His interpretation of the arch form, though quite different from the work of Billner and Metzger, lived up to or exceeded the high expectations of Lancaster and his associates when they set out to build the CRH—create a first-class route with efficient, economical structures that were aesthetically pleasing.[103]

Dry Canyon Creek Bridge, HMP 79.7

Moving east from Mosier, the CRH climbed from less than 100 feet to nearly 600 feet as it followed a portion of an old county road network high above the Columbia. Six miles away, and nearly 80 miles from Portland, the road crossed Dry Canyon Creek on another of McCullough's bridges. The shallow elliptical arch was ideal for this setting. Its decorative work was very much in keeping with what McCullough had included in the Mosier Creek Arch, and his growing collection of reinforced-concrete arch spans across the state.[104]

The Dry Canyon Creek Bridge, completed in 1921, includes a 75-foot reinforced-concrete ribbed deck arch. Its design is similar to the Mosier Creek Bridge because the natural foundations there, with rock outcroppings, were ideally suited to contain the horizontal thrust of arch structures. Here, again, McCullough, created a structure with spandrel columns, pebble-dashed panels, bracketing, and sophisticated railing panels. It is another example of his early work in Oregon and foreshadows larger undertakings a decade later on the Oregon Coast Highway, where he received national acclaim for his designs. The Dry Canyon Creek Bridge is early McCullough at his best, showing his mastery of complicated structural design and of art in concrete.

Completion of the Columbia River Highway to The Dalles

The firm of A. D. Kern, which had won contracts for much of the route in Hood River and Wasco counties, including boring the Mosier Twin Tunnels, began grading this section by late 1919. The work involved taking the CRH down from Rowena Point, at over 600 feet, to Rowena

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[102]For an in-depth account of McCullough's work, see Robert William Hadlow, "Conde B. McCullough, 1887-1946: Master Bridge Builder of the Pacific Northwest" (Ph.D. diss., Washington State University, 1993), 1ff.

[103]Dwight A. Smith, "NAER Inventory—Mosier Creek Arch, Bridge No. 498," U.S. Department of the Interior, Heritage Conservation and Recreation Service, 1981; *Fourth Biennial Report of the Oregon State Highway Commission*,119; *Fifth Biennial Report of the Oregon State Highway Commission*, 143, 507, 509.

[104]*Fourth Biennial Report of the Oregon State Highway Commission*, 119; *Fifth Biennial Report of the Oregon State Highway Commission*, 143, 507, 509.

Canyon and Rowena Creek, at 100 feet in elevation. New locating engineer J. H. Scott used Lancaster's method seen already in the Figure Eight Loops and the Hood River Loops. The lack of any appreciable vegetation on the Rowena Loops made them a more striking visual example of advanced engineering than the other two sets. From Rowena Creek, the highway headed east for ten miles to The Dalles along an abandoned railroad alignment with a relatively easy grade.[105]

On 27 June 1922, the CRH from Portland to The Dalles was officially completed. That day, Simon Benson, with rake in hand, ceremoniously helped spread the "hot stuff" over the roadway near Rowena. His effort symbolically marked the end of a ten-year effort to construct a modern highway through the Columbia River Gorge from Portland to The Dalles. The state highway commission called the feat "probably the most difficult and costly priced highway construction undertaken in America." The undertaking prompted a statewide road building effort, with the Pacific Highway from Portland, through the Willamette Valley to California, the The Dalles-California Highway through central Oregon, and the Lower Columbia River Highway from Portland west to Astoria and the Pacific coast, along with several secondary farm-to-market routes. By the 1920s, the CRH was extended to just west of Pendleton (where the river turns north into Washington), about 200 miles east of Portland. It connected there with the Old Oregon Trail Highway, which headed southeast to the Idaho state line. All of these roads became part of the national highway system by the mid-1920s and received numerical route designations.

The CRH and the Lower Columbia River Highway, later called U.S. 30, had cost about $11 million to construct. Of this, the state financed $7.6 million, the federal government paid $1.1 million, and the counties covered $2.3 million. Multnomah County was the largest contributor of the counties, with $1.5 million. All of this was a far cry from the initial $75,000 allowance that it had expended in 1913 to begin the highway's construction.[106]

Scenic Waysides Recreation Areas and Multnomah Falls Lodge

The CRH opened the Columbia Gorge to expanded recreational use and spawned growth in public and private recreation facilities from Troutdale to The Dalles. These included improved local, state, and federal picnic and camping facilities, public comfort stations, hiking trails, and private restaurants and inns.

Highway supporters saw a need to preserve the Gorge's outstanding landscape for enjoyment. Generous citizens, such as Simon Benson, Guy W. Talbot, George Shepperd, and Mark Mayer, donated large pieces of land to the city of Portland, Multnomah County, the state of Oregon, and the USDA Forest Service for public enjoyment. Interestingly, the city of Portland initially owned many of the park sites in the Gorge, along the CRH, even though they were miles outside of the city's corporate limits.

Multnomah Falls for instance became an important attraction along the highway and is billed as Oregon's most popular natural tourist attraction, with over 2 million visitors annually. The Multnomah Falls area was such a popular destination for highway travelers even in the early

[105] *Fourth Biennial Report of the Oregon State Highway Commission*, 396.
[106] Ibid., 36; *Fifth Biennial Report of the Oregon State Highway Commission*, 54.

1920s that the city of Portland began constructing Multnomah Falls Lodge in 1925 and 1926. Designed in the Cascadian style, this day-use facility replaced a small wooden structure that previously provided minimal tourist comforts on the CRH. Multnomah Falls Lodge continues to serve visitors as a welcome refuge from inclement weather.

Because the Oregon State Parks Division of the highway department did not exist until 1925, and the USDA Forest Service was oriented more toward forest management rather than recreational use of forestlands, the role of caretaker for most sites fell to Portland—a city noted for its park system. Only by the time of World War II did Portland retire from managing parks along the CRH and deeded its land at Crown Point, Shepperd's Dell, the Multnomah Falls Lodge area, and many other sites, to the Oregon State Parks Division or Mount Hood National Forest.

Stephen T. Mather and the Columbia River Highway

During the late summer of 1919, Stephen T. Mather, director of the National Park Service, joined by naturalist Madison Grant, traveled to northern California and then the Pacific Northwest to inspect the region's national parks. He was also interested in possible routes for his "park-to-park" highway, a system of roads that would connect together all of the West's national parks. After helping set up the "Save-the-Redwoods League," in California, Mather and Grant traveled north to Crater Lake. From there, they began their journey to Portland along the The Dalles—California Highway (later US 97) through central Oregon. They complained about widespread logging and subsequent loss of scenic beauty along this route. Eventually, they met up with Lancaster at Hood River, and from here they drove the CRH to Portland. Mather gave Lancaster high praise for engineering the CRH with scenic preservation in mind. The route eventually became a secondary link in Mather's "park-to-park" highway. There is little doubt that Lancaster's CRH influenced the "Lying Lightly on the Land" philosophy that Mather implemented for National Park Service road and trail design beginning in the 1920s.[107]

Obsolescence

Even by the time of its completion in 1922, the CRH was showing signs of early aging. It had become more popular than Hill, Lancaster, or any of its other original promoters ever anticipated. The widespread use of automobiles and freight trucks throughout the country was clearly evident on the CRH. Lancaster's vision of traveling along the road's curves at a top speed of around 25 miles per hour (much less on curves) was a thing of the past, even by the late 1920s. Quickly the route, which was so marveled for its advanced engineering, was destroying itself both physically and philosophically. Motorists tended to speed through beauty spots, more interested in traveling from here to there in as short a time as possible. It was no longer practical for tourists to stop their vehicles in the middle of the road to look at a falls or take in a view of the Columbia Gorge. The OSHD even widened the Mosier Twin Tunnels in the 1930s to accommodate larger automobiles and transport trucks, only to resort to one-way signals in the 1940s to control traffic movements. Rockfall from unstable slopes, especially west of the Mosier Twin Tunnels, were a continual problem.[108]

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[107]Thomas R Cox, *The Park Builders: A History of State Parks in the Pacific Northwest* (Seattle; University of Washington Press, 1988), 27-28 and 32-33.

[108]R. Archibald to Herbert Nunn, 3 October 1920; L. V. Koons, District Maintenance Superintendent, to W. E. Chandler, Division Engineer, Bend, 30 March 1942; W. O. Widdows, Assistant Maintenance Engineer, to E. A.

The CRH had become a vital link in Oregon's and the nation's highway system. In 1933, the federal government made plans for constructing Bonneville Dam on the Columbia River, which involved creating a large backwater, flooding the Union Pacific's OWRN main line near Eagle Creek. The BPR decided to realign the tracks over portions of the CRH alignment, creating the need to reroute the highway with an 837-foot tunnel through the Tooth Rock formation and build a new bridge over Eagle Creek. Construction of the tunnel's east portal in 1937 included cutting away a portion of the CRH east of the Eagle Creek Viaduct—effectively closing forever a segment of the original alignment from Tanner Creek to Eagle Creek as a motor route.[109]

Lancaster, as early as 1932, proposed that the Columbia Gorge needed a modern water-level route to carry commercial traffic. At the same time, he believed in preserving the CRH for its original purpose. By the late 1930s, the Pacific Northwest Planning Council, the OSHD, and others were taking a serious look at transportation along the Gorge. In the years immediately after World War II, a new wide two-lane facility was constructed to connect Portland with The Dalles. Its gentle curves and gradual hills, mostly located on fill material dredged from the Columbia, made it a road that differed greatly in character from the CRH. However, its designers envisioned this route as a scenic highway through the Gorge.[110]

By the early 1950s, the OSHD diverted most of the CRH's traffic to the new two-lane water-level route. It saved segments of the old highway through the falls section in Multnomah County for a tourist route. Other portions in Hood River County and Wasco County became part of local road networks. The state abandoned those portions that included Mitchell Point Tunnel and the Mosier Twin Tunnels, with the bores back-filled to prevent them from becoming attractive nuisances. By the 1960s, construction of the second half of the divided highway through the Gorge, which became Interstate 84, required destruction of Mitchell Point Tunnel.

Collier, Maintenance Engineer, 10 September 1947; Koons to Chandler, 30 March 1942; and W. E. Chandler to E. A. Collier, 3 April 1942, copies in "Thommen Report."

[109]Henry W. Young, "Construction Methods on Tooth Rock Tunnel," *Roads and Streets* 80, no. 2 (February 1937): 70.

[110]Betty H. Huntress, "The Old Road and the New: The Story of Two Highways, One With the Past, Both With the Future, *The Highway Magazine*, January 1950, 14-17; J. F. Waller, "Report of the Reconnaissance Survey, Cascade Locks to The Dalles, June 1936," in file Org 7 Col. R. U., Office of General Files, ODOT, Salem.

National Recognition

In 1971, the U.S. Department of the Interior designated Crown Point a National Natural Landmark. Vista House became a National Register property in 1974, whereas the "Multnomah Falls Lodge and Footpath" was listed in 1981. In 1983, 55 miles of the extant 74 miles of the CRH became a National Register of Historic Places-listed linear resource. In 1984, the American Society of Civil Engineers declared the highway a National Historic Civil Engineering Landmark.

The National Park Service, in 1981, completed a comprehensive study of the CRH and issued several documents. One volume, entitled *Options for Conservation and Reuse* for the CRH, developed strategies for restoring the highway. These included reestablishing the concrete mileposts originally seen along the highway's entire length. All but two of the original posts were lost and ODOT used the remaining posts as templates.

During the early 1980s, the Oregon Transportation Commission took the position that the CRH should be restored. Members acknowledged, however, that this restoration might not "reflect current design standards." This policy has been used repeatedly as the basis for "design exceptions." Between 1985 and 1988, ODOT annually used $150,000 above and beyond normal maintenance dollars, on order of the agency director, for restoration activities.

Congress was one of the CRH's most influential lobbies when it created Public Law 99-663, the Columbia River Gorge National Scenic Area Act in 1986, to protect and provide for enhancement of scenic, cultural, recreational, and natural resources of the Columbia River Gorge. The Act called for preserving and restoring the highway's continuity and historic integrity for public use as a historic road. In addition, the Act called for the creation of recreation trails to connect intact and usable segments.[111]

Since formation of the Columbia River Gorge National Scenic Area (CRGNSA) in 1986, ODOT, in cooperation with the Oregon Parks and Recreation Department, the USDA Forest Service, and the Federal Highway Administration, created a master plan for drivable sections to recreate the atmosphere of a 1920s route. Their vision also included restoring and reopening long-abandoned segments of the CRH for non-motorized use. The first of these, entitled "A Study of the Historic Columbia River Highway," was completed in 1987; a master plan was written in 1996.

Rehabilitating the Columbia River Highway

In 1987, the Oregon Legislature created the Historic Columbia River Highway Advisory Committee to advise ODOT and OPRD regarding rehabilitation efforts on the route, subsequently known as the "Historic Columbia River Highway" (HCRH). It is composed of two citizen members from Multnomah, Hood River, and Wasco counties, along with the Oregon State Historic Preservation Officer and representatives from ODOT, OPRD, and the Oregon Tourism Commission.

[111] *Columbia River Gorge National Scenic Area Act*, Public Law 99-663, 99th Cong., 2d sess. (17 November 1986), sec. 12. The act was later codified as 16 USC 544, see in particular 16 USC 544j.

The 1981 NPS *Guide for Maintenance* noted that nearly every section of stonework on the CRH's drivable sections had mortar problems. In some areas, it was loose, had turned to powder, or was missing. They recommended removal and replacement of deteriorated mortar. In addition, several concrete caps were beyond repair. Beginning in 1983, ODOT masons repaired both mortared masonry and dry masonry structures throughout the highway.

The NPS study also called attention to the deterioration of reinforced-concrete railings on several bridges and viaducts, another important visual element along the highway. Concrete spindles used in the railing panels on three spans were severely cracked because water had penetrated to the reinforcing bar, which was too close to the surface. On other bridges, with a delicate plaster concrete and lath railing treatment, the situation was similar.

The agency's masons cast new spindles for the panels. Coated reinforcing bar, placed deeper within the new spindles than the original reinforcing gives the new rail greater resistance to deterioration. In certain instances, spindles in good original condition were not replaced, so that visitors could see first hand the restored and original elements. The same is true for the railing caps. Finally, ODOT did not artificially age the replacement spindles and caps with lampblack or commercial products. The Columbia River Gorge's severe weather conditions, alone, can darken concrete and new masonry in a short time to match original features.

Installation of new mileposts on drivable portions of the route in 1986 and 1987, as suggested by the *Options for Conservation and Reuse*, symbolized ODOT's commitment to addressing the highway as one resource, and not several state secondary highways that provided transportation links for local traffic. The project is on going because posts are now being placed on the HCRH State Trail segments—once-abandoned portions of the CRH—as they are opened for bicyclists and pedestrians.

The Columbia River Gorge National Scenic Area *Management Plan* (1992) forbids any undertaking that has an "adverse effect" on cultural resources, as defined by 36 CFR 800. It is more restrictive than the National Historic Preservation Act of 1966, as amended, because of this requirement. In addition, most undertakings in the National Scenic Area, whether on the CRH or elsewhere, must be "visually subordinate." That is, they must not be obvious to the casual observer.

In the mid-1990s, ODOT replaced deteriorated "C-rail" and "W-rail" steel guardrail along the drivable sections of the route. The agency hoped to reproduce the original-style fence during its restoration of the highway. The railing, however, did not meet modern highway crash standards. ODOT developed a similar barrier consisting of wooden posts, steel-backed wooden rails, and hardware. The new rail met a 50-mile-per-hour crash standard performed by the Texas Transportation Institute (TTI) and was approved for use on the CRH. The Oregon State Historic Preservation Officer concurred that the project had "No Adverse Effect" on the highway.

ODOT has also completed many restoration projects on formerly abandoned portions of the original alignment. Nearly all of the traces will become part of the HCRH State Trail for non-motorized use. In the Hood River to Mosier section, the agency rebuilt many linear feet of masonry guard walls from their foundations. The availability of photographs of the original structures and standard plans developed in the 1920s made a reconstruction project of this scale

manageable. The resulting product included new courses of masonry faithfully reproduced to the original high standards for craftsmanship. In addition, it installed many linear feet of original-dimension standard wooden guard fence, and removed strips of asphaltic-concrete pavement placed on former gravel shoulders to restore the original 18-foot paved roadway width.

One of the greatest obstacles to rehabilitating the CRH's Hood River to Mosier section as part of the HCRH State Trail was the Mosier Twin Tunnels, closed since 1953 because of rock fall from unstable basalt formations. In more recent years, a citizens' movement supported reopening the tunnels, and the project became the highest priority for the HCRH Advisory Committee, ODOT, and OPRD. The project commenced in 1995 with removal of back fill and lining debris from the tunnels, installation of rock bolts and shotcrete in the tunnel ceilings, and partial installation of new lining.

For visitor safety, a new, reinforced-concrete rock catch structure was installed in the area between the tunnels, a similar structure is under construction immediately west of the tunnels. Masonry walls along a pedestrian cliff walk between the tunnels were restored, but remain inaccessible for visitors because of rock fall hazards. The eastern portions of the HCRH State Trail's Hood River to Mosier section opened to bicycle and pedestrian use in 1997. The western portion is nearing completion. The project has received many accolades, including a "Gorge Stewardship Award" and an "FHWA Environmental Excellence Award" in 1997.

ODOT recycled Port Orford cedar timbers from another state-owned tunnel to complete restoration of the Mosier Twin Tunnels' lining. This was a cost-saving measure, but also an opportunity to reuse rare, large-dimension timbers that are identical to those placed in the tunnels at the time of construction.

In addition to annual maintenance funds for work on the CRH, ODOT has relied on several other sources to carry out restoration and interpretation activities on the highway. These include Federal Aid Highway funds, ISTEA Enhancement funds, Forest Highway funds, and Public Lands Highway Discretionary Funds. It has also found additional support through money authorized by the CRGNSA Act, local agencies, and a large anonymous private donation.

In 1998, the Secretary of the US Department of Transportation designated the HCRH an "All American Road" as part of the FHWA's National Scenic Byways program. All-American Roads provide visitors with a unique driving experience. For travelers, they are destinations unto themselves and exemplify characteristics of the nation's culture, history and landscape. In 1999, the secretary also designated the highway as a Millennium Legacy Trail.

Epilogue—Hill and Lancaster

For Hill and Lancaster, their connection with the CRH ended all too soon. Hill's association with the highway faded some as the road was completed through Multnomah County. He soon delved into other pursuits. Hill focused increasingly on building up his Maryhill estate on the Washington shore of the Columbia. Construction began in earnest during the 1920s on his "castle on the Rhine," a reinforced-concrete mansion. Hill continued to travel the world. He collected globes. He cultivated a personal friendship with Queen Marie of Romania, and became involved in art. Hill also constructed a replica of England's Stonehenge at Maryhill as a

memorial to World War I veterans. He completed the International Peace Arch at the U.S.-Canada border, at Blaine, Washington, in 1921.[112]

Hill pursued highway construction after completing the CRH, but not as vigorously. He was still the good roads' proponent, however, and proudly promoted the border-to-border Pacific Highway. Hill even envisioned it extending northward, through Canada, into Alaska, two decades before construction began on the Alaska Highway. His Washington State Good Roads [and Transportation] Association marked its 100th anniversary in 1999.[113]

Although Hill died in 1931 at the age of 74, his early energy in promoting modern highway construction was not lost. In October 1930, a citizens' committee appointed by the Multnomah County commissioners selected a site near Chanticleer Point as the location for a memorial commemorating Hill's work to promote and construct the CRH, along with other highways in the Pacific Northwest. The committee asked Seattle sculptor Alonzo Victor Lewis, to design several bronze bas-reliefs for a 50-ton chunk of basalt from the Rocky Butte quarry in east Portland. Unfortunately, Hill died before the monument was dedicated.[114]

On 13 May 1932, on the anniversary of Hill's birth, Alonzo Victor Lewis's four bronze bas-reliefs were unveiled. They depicted a group of Indians camped along the Columbia River, Lewis and Clark's Corps of Discovery on the Columbia, nineteenth-century methods of transportation along the river; and a bust of Hill facing east towards the Gorge he so respected. Many dignitaries read tributes to Hill, including Oregon Governor Julius Meier; state treasurer and former Multnomah County commissioner Rufus Holman; and the CRH's first designer, Samuel C. Lancaster. One observer saw the memorial as a fitting tribute to Hill because it was "a monument more in keeping with the character of the man and the great undertaking of the highway and more representative of the country than a monument of polished marble." He added that "It points up the river, where the panorama of the Columbia cutting through the Cascade range is most impressive. This highway was not a one-man project, but it was Sam Hill who was responsible for the inception of it."[115]

Ironically, only a few short months before the CRH was completed through Multnomah County, Lancaster resigned his post as consulting engineer. He left over a dispute with the Multnomah County Commissioners concerning construction costs. Lancaster subsequently gave up his position with the OSHD. He continued to promote the highway's construction as a private citizen, and he devoted much of his time to verbalizing his thoughts in two landmark studies of the Columbia, *Romance of the Gateway through the Cascade Range*, 1915, and *The Columbia: America's Great Highway through the Cascades to the Sea*, 1915, 1916, 1926. After the U.S. entered the First World War, Lancaster was made a plant engineer for the Oregon District of the Emergency Fleet Corporation. Later, in Wilmington, Delaware, he worked with the Delaware State Highway Commission to develop a landscape beautification program. After that, he was employed by the Utah Park Company, a subsidiary of the Union Pacific, where he helped design

[112]Tuhy, *Sam Hill, The Prince of Castle Nowhere*, 144-45, 187-94.

[113]Ibid., 144-45.

[114]"Hill Memorial Site Committee Chosen; Fund Being Raised, *Portland Oregon Journal*, 6 August 1930, 2; "Stone for Hill Monument Now at Highway Site, *Portland Oregon Journal*, 19 October 1930, s. 1, p. 7.

[115]"Road Builder Honored; Huge Granite Monument to Memorialize Sam Hill," *Portland Oregonian*, 18 April 1932, 4; "Monument Honors Late Road Builder," *Portland Oregonian*, 14 May 1932, 4. See also, "Highway Up Gorge Sam Hill's Dream," *Portland Oregonian*, 24 April 1932, s. 1, p. 16.

roads that connected Cedar City, Utah, with Zion and Bryce Canyon national parks, and Cedar Breaks National Monument. His most noted achievement with Utah Park Company was his work along the north rim of the Grand Canyon, in Arizona.[116]

Meanwhile, Lancaster had purchased, in 1922, a 72-acre tract north of the CRH, near the present site of Bonneville Dam. He built a rustic lodge nestled in a stand of virgin timber, overlooking the Columbia River. He also constructed tent cottages and outdoor community fireplaces linked to the lodge by "nature" trails. Lancaster's Lodge could accommodate more than 200 guests, where they peacefully communed with nature. He also created satellite camps in the mountains south of the Columbia and accessible from the Forest Service's Eagle Creek Campground. Lancaster saw vast potential in Oregon as a vacationland, like the Swiss Alps, or the national parks.[117]

Lancaster, though, was not much of a businessman. The resort was a financial failure, so he undertook some small-time consulting jobs. By 1930, he had sold the property, which the state would eventually own. Throughout the 1930s, Lancaster was a great supporter of the Bonneville Dam construction on the Columbia. Interestingly, even as an ardent preservationist, he believed that the dam was something necessary for the greater good of the population, in part because of the increased recreational possibilities that it offered. He even laid out Bonneville Park, in 1935, on part of his former resort grounds, for use by construction workers on the dam.

Samuel Lancaster died from leukemia in 1941 nearly thirty years after he envisioned the CRH from the front veranda of the Chanticleer Inn. Although he went on to other projects in the intervening years, Lancaster's single most important lifetime accomplishment—his master lifework—remained the Historic Columbia River Highway.[118]

[116]Fahl, "S. C. Lancaster, Engineer as Conservationist," 127-28.
[117]Ibid., 129-30.
[118]Ibid.

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__ Previous documentation on file (NPS):
__ Preliminary Determination of Individual Listing (36 CFR 67) has been requested.
_X_ Previously Listed in the National Register.
__ Previously Determined Eligible by the National Register.
__ Designated a National Historic Landmark.
_X_ Recorded by Historic American Buildings Survey: #OR-163, Vista House
_X_ Recorded by Historic American Engineering Record: #OR-36, Historic Columbia River Highway; OR-23, Shepperd's Dell Br.; OR-24, Latourell Creek Br; OR-30, Dry Canyon Creek Br.; OR-49, Moffett Creek Br.

Primary Location of Additional Data:

__ State Historic Preservation Office
__ Other State Agency
__ Federal Agency
__ Local Government
__ University
_X_ Other (Specify Repository): Oregon Department of Transportation

10. GEOGRAPHICAL DATA

Acreage of Property: approximately 500 acres
UTM References:

Sheet 1 of 9
The Dalles North, Oregon-Washington, 1:24000

Point	Zone	Easting	Northing
A	10	639120	5054460
B	10	639620	5055620
C	10	639200	5057330
D	10	638770	5057520
E	10	638580	5057930
F	10	637770	5058060
G	10	637000	5058500
H	10	636320	5058550

Sheet 2 of 9
Lyle, Washington-Oregon, 1:24000

Point	Zone	Easting	Northing
I	10	633560	5059360
J	10	632550	5059270
K	10	632370	5060150
L	10	631410	5059450
M	10	631320	5060370
N	10	628170	5061010
O	10	627480	5060530
P	10	626700	5060530

Sheet 3 of 9
White Salmon, Washington-Oregon, 1:24000

Point	Zone	Easting	Northing
Q	10	626160	5060950
R	10	624940	5059940
S	10	624110	5060080
T	10	624100	5059790
U	10	623740	5060170
V	10	622400	5060010
W	10	618290	5061730
X	10	618040	5062050
Y	10	616760	5062390

Sheet 4 of 9
Hood River, Oregon-Washington, 1:24000

Point	Zone	Easting	Northing
Z	10	616030	5062580

A2	10	616030	5062550

Sheet 5 of 9
Bonneville Dam, Washington—Oregon, 1:24000

Point	Zone	Easting	Northing
B2	10	584910	5056870
C2	10	585810	5056470
D2	10	585710	5056310
E2	10	585330	5055870
F2	10	585170	5055630
G2	10	584900	5055400
H2	10	584500	5055180
I2	10	584110	5054770
J2	10	583640	5054530
K2	10	583110	5054210
L2	10	582970	5054220
M2	10	582850	5054120
N2	10	582280	5053900

Sheet 6 of 9
Multnomah Falls, Oregon—Washington, 1:24000

Point	Zone	Easting	Northing
O2	10	577880	5051290
P2	10	577040	5051250
Q2	10	575610	5050770
R2	10	574810	5050110
S2	10	574310	5049770
T2	10	574120	5049440
U2	10	573090	5048820
V2	10	572110	5048640
W2	10	570050	5047630
X2	10	568430	5047130

Sheet 7 of 9
Bridal Veil, Oregon—Washington, 1:24000

Point	Zone	Easting	Northing
Y2	10	566940	5047000
Z2	10	565860	5046520
A3	10	563970	5044580
B3	10	561590	5043090
C3	10	560000	5042560
D3	10	559860	5042250
E3	10	559290	5043010
F3	10	559150	5042850
G3	10	559100	5043030
H3	10	558570	5042130

Sheet 8 of 9
Washougal,Washington—Oregon, 1:24000

Point	Zone	EastingNorthing	
I3	10	555430	5042080
J3	10	553850	5041430
K3	10	553670	5040630
L3	10	552590	5040450
M3	10	552470	5040630
N3	10	550290	5040430
O3	10	549380	5039900
P3	10	549160	5042430
Q3	10	548800	5042780

Sheet 9 of 9
Camas, Washington—Oregon, 1:24000

Point	Zone	EastingNorthing	
R3	10	548740	5042730

Verbal Boundary Description:

Columbia River Highway
Multnomah County, Hood River County, and Wasco County, Oregon

The NHL district contains several extant portions of the as-built Columbia River Highway (1913-22) in the Columbia River Gorge, from the Sandy River, city of Troutdale, Multnomah County, eastward through Multnomah County, across the width of Hood River County, and into Wasco County to Chenoweth Creek, at the northwest city limits of The Dalles. The western boundary of the district is the west end of the Sandy River Bridge, No. 2019, located at HMP 14.2 on the Historic Columbia River Highway No. 100. The eastern boundary is the south end of the Chenoweth Creek Bridge, No., 506, located at HMP 88.5 on the Historic Columbia River Highway No. 100. The Sandy River (Stark Street) Bridge, No. 11112, also located near the western boundary of the district, at HMP 16.7, is included in the district. The district area extends from the south end of the bridge to the south right of way line of the Historic Columbia River Highway at the bridge location.

The nomination of the highway creates a narrow, linear-shaped district. The area mileage between the termini is 74.3 miles, the length of the original highway. The nominated highway within that 74.3-mile distance is restricted to 51 of the extant 55 miles. It includes those portions which are still intact with observable engineering features of the original highway present (pavement, guard walls, retaining walls, bridges, viaducts, tunnels, pedestrian overlooks, and distinct cuts and fills) and possess a high-level of integrity. The extant 55 miles of highway is the total of the remaining portions and is not a single continuous section of roadway. The 51 miles within the NHL district, therefore, are not continuous from terminus to terminus, but consists of separate remaining segments of the highway.

The district is divided into three segments:

Segment 1, Sandy River to Warrendale (HMP 14.2 to 38.5), is nearly continuous for 24.3 miles. Segment 2, Tanner Creek to Cascade Locks (HMP 41.7 to 45.8), consists of once-abandoned roadway restored for non-motorized use. Segment 3, Hood River to The Dalles (HMP 65.8 to 88.4), consists of 17.3 miles of drivable roadway and 5.1 miles of restored roadway for non-motorized use.

Excluded from the district are the travel lanes, paved shoulders and interchange areas of Interstate 84 (from Warrendale to Hood River), and intersection areas of other state highways where they coincide with the original route of the Columbia River Highway. These later highway developments most likely destroyed the original highway during their constructions, so the original highway would no longer be extant at these locations.

An exception to the Interstate 84 exclusion is the Toothrock Tunnel (1937), which contains the eastbound lanes of Interstate 84. The tunnel is specifically included in the district because of its association with the Columbia River Highway. It was bored through a prominent basalt formation below and to the south of the CRH, which is carried around north-facing sheer cliffs on the Toothrock and Eagle viaducts. The tunnel is discontinuous with the CRH. The tunnel boundaries extend from portal to portal and also include the masonry retaining walls, lantern and column, and parapets outside the portals. The somewhat lenticular-shaped piece of land north of the tunnel and south of the CRH right-of-way is included in the district.

The intact highway area within the district is 375 acres.

SOURCE: Dwight A. Smith, Environmental Section, Oregon Department of Transportation, Salem, Oregon, 1983. Revised by Robert W. Hadlow, Ph.D., Region 1, Oregon Department of Transportation, 1999.

**Portland Women's Forum State Scenic Viewpoint*
Multnomah County, Oregon**

(ROW File 29540—3.71 Acres)

Beginning at the quarter section stake between Sections 25 and 36, in Township 1 North of Range 4 East of the Willamette Meridian; thence on half section line North 900 feet to a point in the center line of Rooster Rock Road; thence West 230 feet to a point in the centerline of Rooster Rock Road, being County Road No. 481, as now surveyed and laid out; and thence in a Southerly direction along the center line of said road to where said center line intersects the line first above described, being in the SE ¼ SW ¼ of said Section 25, Township 1 North of Range 4 East of the Willamette Meridian, EXCEPT that portion used for road purposes.

Also that certain tract beginning at a point North 500 feet along the half section line of Section 25 starting from the quarter section corner between Sections 25 and 36, Township 1 North,

*Portland Women's Forum State Scenic Viewpoint, a.k.a. Portland Women's Forum State Park, has a total area of 7.26 acres. The area included in the historic district is 9.26 acres, which includes two acres of the county road right-of-way, which traverses the park but is not in state ownership.

Range 4 East of the Willamette Meridian; running thence East parallel with the South line of said SE ¼ of Section 25 to the center line of Rooster Rock Road, being County Road No. 481; thence running Northwesterly along the center line of said road till the same intersects the half section line of said Section 25 above mentioned; thence South along said half section line to the place of beginning, all being in said Section 25, Township 1 North, Range 4 East of the Willamette Meridian.

Beginning at a point in the West line of the SE ¼ of Section 25, Township 1 North, Range 4 East of the Willamette Meridian, which is located 437.50 feet North 3° 59' 30" east from the Southwest corner of said SE ¼ of Section 25; running thence on the West line of said SE ¼ of Section 25, 62.50 feet to the Northwest corner of a certain 3-acre tract deeded by Martha Dabney to the County of Multnomah, November 7, 1927, and recorded in Book 1114 on Page 329, Deed Records; thence South 86° 58' 30" East on the North line of said 3-acre tract 177.61 feet to a point in the Westerly boundary line of County Road No. 1129; thence Southeasterly on said boundary line on a curve to left of 110 foot radius (the chord of which bears South 28° 6' East 0.99 feet) a distance of 0.99 feet to a point; thence South 74° 2' 20" West, 189.48 feet to the place of beginning, all in Section 25, Township 1 North, Range 4 East of the Willamette Meridian, SUBJECT to all reservations and easements noted in said deed from Martha Dabney to the County of Multnomah; and EXCEPT the portions thereof in the road.

EXCEPT that part of the foregoing included in a deed from Multnomah County, Oregon, to the State of Oregon, recorded in Book 1543, Page 496, Deed Records, which said portion is more particularly described as all the land embraced in the foregoing description lying West of the North-South center line of Section 25, Township 1 North, Range 4 East, of the W. M., as well as the tract conveyed to Multnomah County by deed recorded March 19, 1928 in Book 1134, Page 381, Deed Records.

(ROW File 31041—3.55 Acres)

PARCEL 1
A parcel of land lying in Section 25, Township 1 North, Range 4 East, Willamette Meridian, Multnomah County, Oregon, and being that property described in that certain deed to Elliott J. Staten and Ruby L. Staten, recorded in Book 1754, Page 327 of P. S. Deed Records of Multnomah County; the said parcel being described as follows:

Beginning at a point in the center line of County Road No. 1129, North 10° 40' West 290.55 feet from the quarter section corner on the South side of said section; running thence North 89° 46' West parallel to the South line of said Section 25, 314.55 feet to an iron pipe; thence North 0° 14' East 199.42 feet to an iron pipe in the Southerly line of a tract of land conveyed to Multnomah County by deed recorded in P. S. Deed Book 1134 at Page 382; thence South 77° 36' East along said Southerly line and the same extended, to an intersection with the center line of said Road No. 1129; thence Southerly along said centerline to the point of beginning.

The parcel of land to which this description applies contains 0.95 acre, outside of the existing right of way.

PARCEL 2
A parcel of land lying in Section 25, Township 1 North, Range 4 East, Willamette Meridian, Multnomah County, Oregon, and being that property described in that certain deed to Elliott J. Staten and Ruby L. Staten, recorded in Book 1117, Page 453 of P. S. Deed Records of Multnomah County; the said parcel being described as follows:

Beginning at the quarter section corner between Sections 25 and 36 in Township 1 North, Range 4 East of the Willamette Meridian and running thence North 10° 40' West along the center line of Rooster Rock Road, said road being County Road no. 481 as now surveyed and laid out, a distance of 290.55 feet; thence North 89° 46' West and parallel with the section line between said Sections 25 and 36, a distance of 470.55 feet; thence South 10° 40' East and parallel with the said center line of County Road No. 481 aforesaid 290.55 feet to the center line of the Columbia River Highway, said center line being the section line between said Sections 25 and 36; thence South 89° 46' East 480.55 feet to the place of beginning, EXCEPTING a strip 30 feet wide extending across the Easterly and Southerly sides of herein described tract, said strip being in County Roads.

The parcel of land to which this description applies contains 2.6 acres.

Including that portion of County Road 1129 in Sections 25 and 36, T.1N, R. 4E., Willamette Meridian, beginning at the Historic Columbia River Highway right-of-way and continuing northerly to a line being the extension of the northernmost line of Portland Women's Forum State Park, encompassing 2.0 acres.

The total acreage of the parcels described is 9.26 acres.

SOURCE: Ed Schoaps, Oregon State Parks and Recreation Division, ODOT, Salem, Oregon, September 1983.

Crown Point Vista House*, Crown Point State Scenic Corridor
Multnomah County, Oregon

(File P-980—0.65 Acre)

Lots 3 and 4, Block 6, Thor's Heights, situated in Section 30, Township 1 North, Range 5 East, Willamette Meridian, Multnomah County, Oregon.

EXCEPT that portion lying within that property conveyed to the State of Oregon by that certain deed recorded in Book 478, Page 415 of Multnomah County Records of Deeds.

The parcel of land to which this description applies contains 0.65 acre.

(File P-289—0.79 Acre)

*"Vista House." was listed on the NR on December 5, 1974. The nomination name was The boundaries were not precisely defined in the nomination, " . . . located atop Crown Point in the SW ¼ Sec. 30, T. 1N., R5E, of the Willamette Meridian, Multnomah County, Oregon." The boundary area in the nomination was estimated to be 3 acres. Crown Point State Scenic Corridor was previously known as Crown Point State Park.

Beginning at a point in the east line of Thor's Heights, as shown on the plat of same recorded in Multnomah County, Oregon, said point being 400 feet southerly from an iron pipe at the northeast corner of the NW ¼ of the SW ¼ of Section 30, Township 1 North, Range 5 East of the Willamette Meridian, and running thence east 38.56 feet, more or less, to the center line of the Columbia River Highway, No. 754A; thence tracing the center of said road no. 754A North 3° 59' 50" East 268.88 feet, more or less, to Station 375+16.70, the beginning of a curve to the left having a radius of 110 feet, through an arc of 225° 09' 30" a distance of 432.45 feet to Station 378+84.25 and end of curve; thence South 41° 09' 40" east 45.94 feet to Station 370+38.31 the beginning of a curve to the right, having a radius of 140.06 feet, through an arc of 71° 29' 30" a distance of 174.76 feet to Station 368+63.55 and end of curve; thence leaving the center line of the highway and running east 90.94 feet, more or less to the place of beginning, excepting therefrom the area included in the right of way of the Columbia River Highway and containing 0.79 acre, more or less, this being the identical piece of property conveyed to Multnomah County by the City of Portland on March 2, 1916, and recorded in Book 703, on page 462 Deed Records of Multnomah County, Oregon.

The total of the two parcels described is 1.44 acres.

SOURCE: Ed Schoaps, Oregon State Parks and Recreation Division, ODOT, Salem, Oregon, September 1983.

Guy W. Talbot State Park at Latourell Falls
Multnomah County, Oregon

That portion of Guy W. Talbot State Park which is part of the Northwest quarter of the Southeast quarter (NW ¼ SE ¼) and the Northeast quarter of the Southwest Quarter (NE ¼ SW ¼ of Section 29, Township 1 North, Range 5 East of the Willamette Meridian in Multnomah County, Oregon, described as follows:

Beginning at a point which is South, 118.06 feet from the center of Section 29; thence South 89° 45' 54" West 200 feet; thence South parallel to the North-South centerline of Section 29 to the South line of the Northeast quarter of the Southwest quarter (NE ¼ SW ¼ of Section 29; thence East along said South line to the Southeast corner of said Northeast quarter of the Southwest quarter (NE ¼ SW ¼); thence East, 276 feet along the South line of the Northwest quarter of the Southeast quarter of Section 29; thence North to a point on the Southerly right of way line of the Alex Barr County Road No. 566; thence Westerly and Northerly along said County Road right of way to a point which is North 89° 45' 54" E, 48.40 feet from the point of beginning; thence South 89° 45' 54" West, 48.40 feet to the point of beginning.

This parcel of land contains 13.0 acres.

SOURCE: Ed Schoaps, Oregon State Parks and Recreation Division, ODOT, Salem, Oregon, September 1983.

**Shepperd's Dell State Natural Area*
Multnomah County, Oregon**

Beginning at a point which is fixed by starting at the Northeast corner of the Northwest quarter of the Northwest quarter (NW ¼-NE ¼) of Section 28, Township 1 North, Range 5 East of the Willamette Meridian, running thence South 138 feet to a point; thence South 82° 50' West 311.5 feet to a point on the old county road, which point is the beginning point of the property to be described herein; running thence South 55° 27' West 62.5 feet; thence South 68° 19' West 463.0 feet; thence South 55° 23' West 260.0 feet; thence North 70° 07' West 180.5 feet; thence South 69° 43' West 118.0 feet; thence South 52° 13' West 256.5 feet; thence North 46' 30' West 335.4 feet; thence North 43° 43' East 392.5 feet along O.W.R.&N. right of way; thence North 38° 55' East 186.0 feet along O.W.R.&N. right of way; thence East 00° 00' 608.0 feet; thence South 14° 0.4' East 70.4 feet; thence South 60° 06' East 134.0 feet; thence South 66° 43' East 68.0 feet; thence South 87° 24' East 246.5 feet to the point of beginning and containing a total of 10.96 acres, including Columbia River Highway right of way of .93 acre, leaving a total of 10.03 acres.

SOURCE: Ed Schoaps, Oregon State Parks and Recreation Division, ODOT, Salem, Oregon, September 1983

**Wahkeena Falls Recreation Site, USDA Forest Service—Columbia River Gorge National Scenic Area
Multnomah County, Oregon**

Beginning at a point on the south right of way line on the Historic Columbia River Highway due south of the southwest end of the Wahkeena Falls (Youngs Creek) highway bridge; thence 500 feet west along the highway right of way line; thence 1000 feet south; then 1000 feet east; thence about 1200 feet north to the south right of way line of the Historic Columbia River Highway; thence west approximating the south right of way line of the Historic Columbia River Highway to the point of beginning, about 500 feet; basically forming a square containing Wahkeena Falls, the cascade below the falls, portions of the trail, and the footbridge all located south of the Historic Columbia River Highway within Mount Hood National Forest and all being in said Section 13, Township 1N, Range 5 East and Section 18, Township 1N, Range East of the Willamette Meridian. The total acreage of the parcel described is 25.3 acres.

SOURCE: Dwight Smith, Environmental Section, Oregon State Highway Division, ODOT, September 1983. Revised by Robert W. Hadlow, Ph.D., Region 1, Oregon Department of Transportation, 1999.

*Shepperd's Dell State Natural Area was previously known as Shepperd's Dell State Park.

Multnomah Falls Lodge*, Multnomah Falls Recreation Site, USDA Forest Service—Columbia River Gorge National Scenic Area
Multnomah County, Oregon

At the quarter-corner of Sections 7 and 18, Township 1 North, Range 6 East, W.M., as monumented and described in the records of the Surveyor General, thence north 36° 09' 29" east 211.30 feet (calculated) to Angle Point C, point of beginning. Angle Point C is 200 feet south of the top of Upper Multnomah Falls. From POB, the line descends a ridge, bearing north 68° 55' 21" west 1012.62 feet (calculated) to Angle Point D. Thence the line descends a cliff, bearing north 8° 52' 50" east 318.76 feet (calculated) to Angle Point E. Thence the line parallels the southern edge of the Old Columbia River Gorge Scenic Highway, bearing north 72° 14' 07" east 709.67 feet (calculated) to Angle Point A. Thence the line ascends a cliff and steep ridge bearing south 36° 42' 38" east 705.37 feet (calculated) to Angle Point B. Thence the line crosses Multnomah Creek bearing south 31° 47' 56" west 386.02 feet (calculated) to Angle Point C, POB. All points, bearings and distances are calculated and subject to minor adjustment in actual field location. It is the intent that the boundary lines should allow as a minimum a 200 foot buffer to ensure adequate protection of Multnomah Falls Lodge and Upper and Lower Multnomah Falls. This parcel of land contains 13.7 acres.

SOURCE: Jonathan Horn and Mary Stuart, Mount Hood National Forest, Gresham, Oregon, September 1980.

Eagle Creek Campground and Picnic Area and Eagle Creek Overlook Picnic Area, USDA Forest Service—Columbia River Gorge National Scenic Area, Multnomah County, Oregon

The following describes the boundaries of the actual acreage included in the Eagle Creek Campground and Overlook:

Commencing at the Witness Corner set 23 chains south of the section corner common to Sections 15, 14, 23 and 22, Township 2 North, Range 7 East, Willamette Meridian, surveyed, Multnomah County, Oregon, as described in the records of the U.S. Army Corps of Engineers, 1934, south 24° 44' west 1275 feet (calculated) to a point, State Place Coordinates, Oregon North Zone, X=1635988.9, Y=723921.4, point of beginning. From POB, the line bears south 39° 40' east 331 feet (calculated), thence-south 13° 26' east 328 feet, (calculated), thence south 30° 34' east 274 feet (calculated), thence south 46° 50' east 713 feet (calculated), thence south 16° 55' east 695 feet (calculated), thence south 10° 23' east 291 feet (calculated) to the Eagle Creek trailhead, thence south 3° 12' west 134 feet, thence north 54° 2' west 235 feet following the western shoreline of Eagle Creek, thence north 18° 59' west 410 feet, thence north 38° 57' west 332 feet, thence north 51° 22' west 266 feet, thence north 73° 2' west 392 feet, thence north 83° 40' west 283 feet, thence north 79° 20' west 380 feet, thence north 65° 48' west 270 feet, thence north 88° 26' west 506 feet, thence north 82° 57' west 215 feet, thence north 67° 33' west 345 feet, thence north 34° 4' west 270 feet to the mouth of Eagle Creek, thence north 18° 32' east 378 feet to the northwesterly most point of land on the overlooking bluff, thence north 67° 45' east 797 feet, thence south 76° 40' east 82 feet, thence north 73° 21' east 189 feet, thence south 48° 14' west 911 feet along the crest of the road cut of Interstate 84, thence south 52° 16' west 171

*This area was listed in the National Register of Historic Places on April 22, 1981. The verbal boundary description is from the nomination entitled "Multnomah Falls Lodge and Footpath."

feet, thence north 89° 56' west 192 feet, thence south 47° 28' east following Forest Service Road 241 along the eastern shoreline of Eagle Creek, not including any portion of the Cascade Salmon Hatchery, thence south 80° 23' east 399 feet, thence north 72° 32' east 335 feet, then north 82° 16' east 220 east feet, then south 61° 11' east 161 feet, thence north 46° 0' east 236 feet, thence north 10° 15' east 156 feet, thence north 26° 45' east 205 feet, thence north 37° 50' east 218 feet, thence from State Plane coordinates and the resulting bearings and distances are subject to adjustment in actual field location.

The boundaries so described delineate an area 48 acres in extent and one intended to encompass all features of the Eagle Creek Recreation Area, including the suspension bridge, campground, trailhead, and overlook area, as built in 1915 and expanded 1935-1937.

SOURCE: Susan Marvin, Mount Hood National Forest, Gresham, Oregon, September 1983.

Rowena Crest Overlook, Mayer State Park
Wasco County, Oregon

That portion of Mayer State Park being the S ½ of the SE ¼ of the NW ¼ of the SE ¼ of Section 3, T.2N., R.12E., Willamette Meridian, Wasco County, encompassing 5 acres.

SOURCE: Ed Schoaps, Oregon State Parks and Recreation Division, ODOT, Salem, Oregon, September 1983.

Boundary Justification:

The boundaries for the NHL District Nomination represent portions of the 1983 NR historic district nomination. All properties included in the NHL District Nomination were previously included in the 1983 NR historic district nomination.

The district width of the highway varies, but the average is 60 feet. This is the original right-of-way width for the highway (30 feet on either side of the highway centerline). The highway pavement is normally 24 feet from outside edge to outside edge, with two travel lanes. Recently, though, the Oregon Department of Transportation has removed about six feet of pavement (three feet on either side of the roadway) to reestablish the original 18 feet of pavement and 3-foot shoulders on abandoned sections of the CRH now restored for non-motorized use as the HCRH State Trail.

The district is wider at some locations to incorporate slopes, geologic features, other highway engineering features, and recreation areas. (See the boundary descriptions for recreation areas included in the district.) The district traverses cities and communities on streets that contain the highway's route. Where curbs exist on these streets, the width of the district is the distance from the present curb line to curb line. If no curbs exist in the cities or communities, the width of the district is limited to the existing highway pavement, outside edge to outside edge.

11. FORM PREPARED BY

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